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To EDWIN A. START

Secretary American Forestry Association

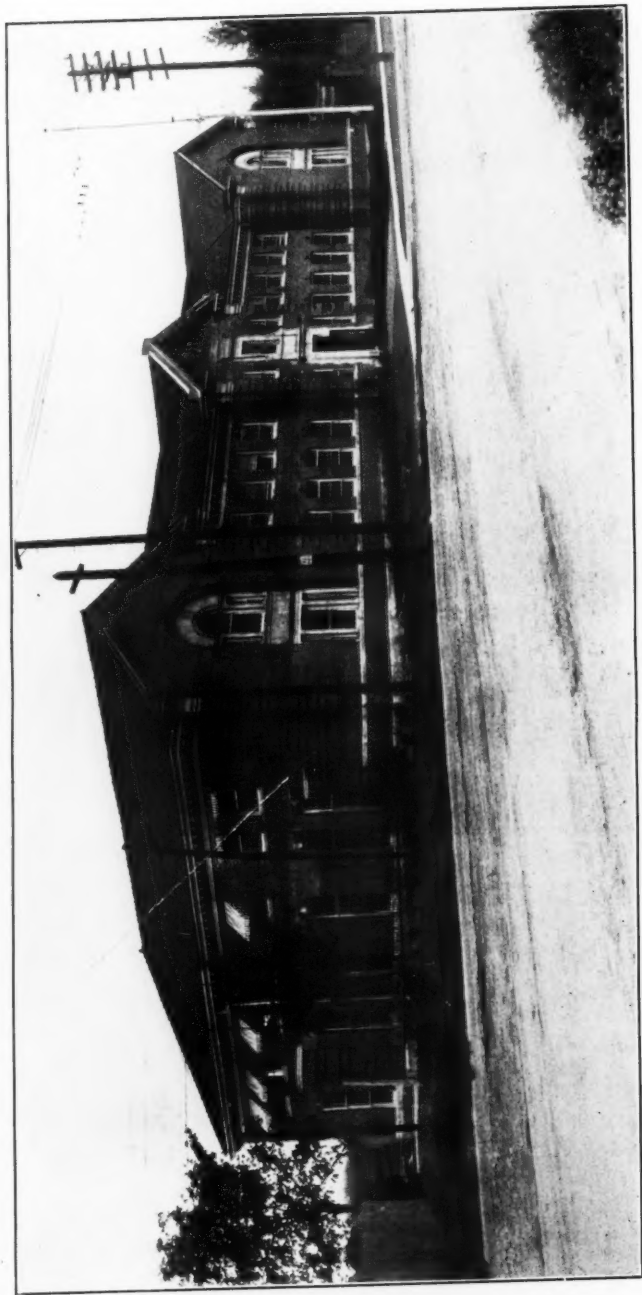
1410 H Street N. W., Washington, D. C.

Dear Sir: I hereby signify my desire to become a member of the American Forestry Association. One dollar (\$1.00) for annual dues is enclosed herewith.

Very truly yours,

Name _____

P. O. Address _____



THE FOREST PRODUCTS LABORATORY
Madison, Wisconsin

AMERICAN FORESTRY

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No. 7

THE NEW FOREST PRODUCTS LABORATORY

By EDWIN A. START

(Last month, in AMERICAN FORESTRY, William L. Hall, assistant forester in charge of the Branch of Products, United States Forest Service, set forth clearly the key thoughts underlying the work of his branch and the significance of the new laboratory, which was formally opened June 4, and which is described in detail below.)

THERE are still lumbermen, and other citizens less directly interested, who regard the work of the Forest Service as impractical and in the air, but not one of them can come into contact with the branch of products without recognizing the immediate economic value and applicability to business of the solutions of the problems with which it deals, for the task of this branch of the service is to ascertain the best uses for all forest products and the best and cheapest way to obtain them, without waste in the forest or at the mill. That is a simple business question, is it not? And the most hardened Philistine can see it.

And because no capable business man can fail to see this, and because the work of the branch of products is only an interlocking and dependent part of the whole forestry program, this branch has in its power, with the facilities it now commands, to do more than any other agency to educate the men of the wood-using industries into true believers in the complete forestry gospel.

It is about five years since the efforts began to obtain such a laboratory, but Congress would not provide for it, and it was only through the cooperation of the University of Wisconsin that it was finally made possible. There was a keen rivalry between Minnesota, Wisconsin, and Michigan for the institution, but it was finally located in Wisconsin. No mistake would have been made in locating it in any one of these states, but to an unprejudiced observer the present surroundings seem particularly fortunate. Wisconsin still ranks near the head of the list of lumber states and its paper and other wood-using industries are important. Its prosperity rests on the fundamental industries of the soil and the forest. In the development of its university it closely followed Michigan as the western leader in higher educational work, and for many years its university has ranked with the first state universities of the country. In no state has the university so nearly met the needs of the people and made itself so much a part of their daily lives. Here is realized the ideal which was in the minds of the founders of William and Mary College, when they put it down at one end of the Duke of Gloucester Street in the old colonial capital of Virginia, looking through the long vista to the capital at the other. From



DESTRUCTIVE DISTILLATION

this juxtaposition, Washington, who was chancellor of the old Virginia college, drew the idea of a great national university in the nation's capital, an idea which was never carried out, although he made a bequest to the nation for the purpose. This northwestern state has become the heir of the tradition, and in Madison it is carried out physically and in spirit, for the university is the real leader of thought and development in the state. Its great central building looks down State Street to the capitol. Its library, an exceptionally fine one, worthily housed, is the state library as well. Educators and legislators work together for the state; not, indeed, without much of the friction inevitable in our politics, but with good results in the large.

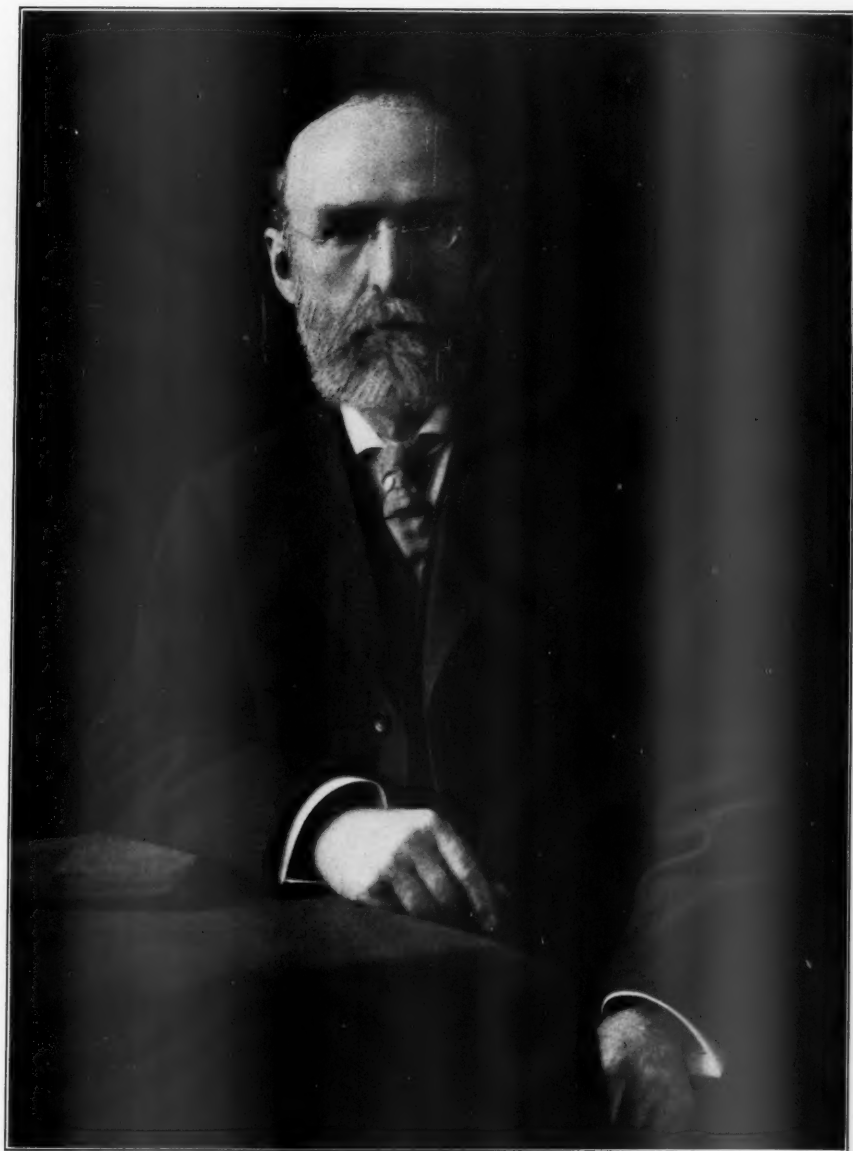
Wisconsin also still has great forests and wood-using industries, the latter consuming annually over 900,000,000 feet of lumber, valued at \$20,000,000, fifty-one per cent of which comes from without the state, the forests of which are now threatened with early ex-

haustion. This does not take into account large quantities of material from the sawmills that is not considered available for future manufacture. The problem of preventing waste by more complete utilization is therefore of the highest importance to the future prosperity of the state. Wisconsin also has a state forest service of great efficiency, free from political control, which goes at things in a vigorous, western way and has a definite policy that is pursued with steady purpose.

The city of Madison is rarely endowed by nature so that the environment is in every way favorable for the life and work of the products staff of the Forest Service which, as our readers know, will now have its headquarters in Madison, instead of in Washington.

THE OPENING EXERCISES

The new plant, in its extent and completeness, was a gratifying surprise to most of those who saw it for the first



CHARLES R. VAN HISE

President of the University of Wisconsin, Chairman of the State Board of Forestry, and one of the foremost advocates of conservation of natural resources



WASTEFUL LUMBERING

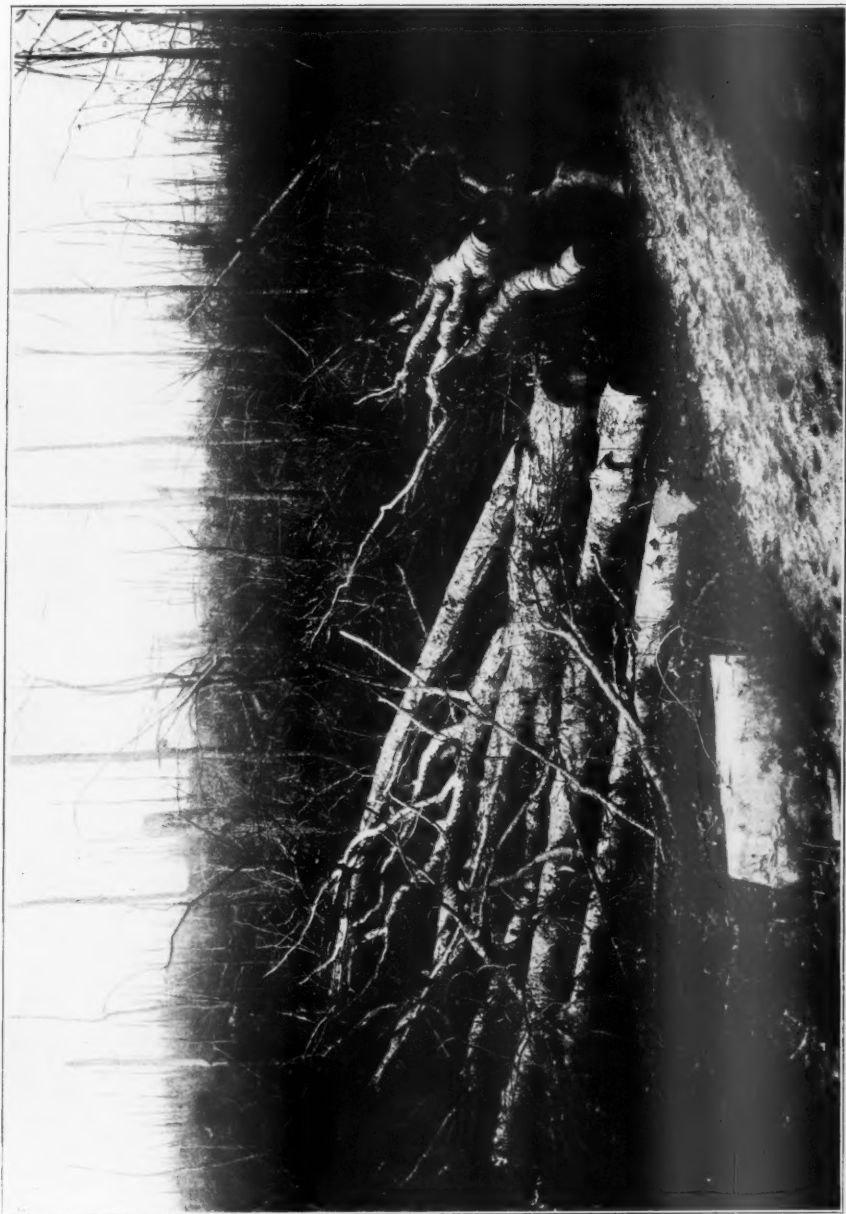
Redwood, red fir, and spruce in California

time at the formal opening on the 4th of June. Typical operations were in progress in all the departments, and the visitors, numbering nearly 500, had an opportunity to see the plant in action. There were in attendance representatives of the American Paper and Pulp Association, Beer Stave Manufacturers' Association, Michigan Hardwood Manufacturers' Association; National Box Manufacturers' Association, National Electric Light Association, National Hardwood Lumber Association, National Slack Cooperage Manufacturers' Association, National Lumber Manufacturers' Association, National Hickory Association, National Wagon Manufacturers' Association, Wheelmakers' Club, Northern Hemlock and Hardwood Manufacturers' As-

sociation, Northern Pine Manufacturers' Association, Northwest Cedar-men's Association, Vehicle Woodstock Company, Wood Preservers' Association, Yellow Pine Manufacturers' Association, Field Museum, Chicago; American Society of Civil Engineers, American Forestry Association, educational institutions, technical periodicals, railroads, and large concerns engaged in every wood-using industry.

The exercises were simple and appropriate. The building was inspected and the work explained during the fore-

noon, and, after luncheon, attended by about 150, in one of the university halls, there were addresses by Governor Davidson, Henry S. Graves, forester of the United States; Charles R. Van Hise, president of the University of Wisconsin; Capt. J. B. White, chairman of the Committee on Conservation, National Lumber Manufacturers' Association; B. R. Goggins, of Grand Rapids, Wis., representing the American Paper and Pulp Association, and O. B. Banister, of Muncie, Ind., representing the implement and vehicle industries. The speaking was in every way suited to the occasion, each speaker filling well a distinct place. Ex-Governor W. D. Hoard, chairman of the board of regents of the university, presided.



WASTEFUL LOGGING OF WHITE PINE

The trees are felled without attention to possible breaks and logs are cut from trees with no attention to "limber fitting"

Governor Davidson, speaking for the state, set forth with abundant facts its relation to this national institution that has been placed in Wisconsin with the cooperation of the state. He used an array of statistics in regard to the forest products of the state, which are just being made available through joint investigations of the United States and Wisconsin forest services. Of the inter-dependence of natural resources, the governor well said:

Every one of our great natural resources exerts far-reaching influence. Every industry in this country has profited vastly by the existence of our iron and coal deposits. In the same way, every industry in the United States has been helped—indeed, has been more than helped: has been in part created—by an abundant supply of the most useful kinds of timber.

The forest, in fact, bears a relation to other resources and to their dependent industries which is entirely peculiar. If we speak of the right use of the forest, and understand the full meaning of our words, we know that we cover not only the products which come from the trees themselves, but the influence which the forest bears to resources and industries outside of itself. If we speak of forest waste, we should bear in mind that our meaning extends not only to wood that is not used, but to soil which cannot be used, water which cannot be used, improvements which cannot be used, and even power which cannot be used, because of the misuse of that controlling factor, the forest.

I want to make very clear this point—that when we misuse the forest, we waste not only its products, but, also, other very important resources. Nature has placed in effect a direct and vital relation between forests and soils, and forests and streams, that must be heeded by man if he is to reap a full harvest from any of these resources.

And of waste in lumbering, he said (and in Wisconsin people know something about this):

It is of great importance to all wood-using industries of the United States to bear in mind that our present imperfect use of the forest also causes great waste of wood itself, which is a most important material. This waste begins when the lumberman first sinks his ax into the tree in the woods, and does not end until the piece of wood is fitted into final form and goes into use. We waste about half of the tree getting the other half into useful form. It has been the practice to leave a considerable part of the tree, and oftentimes the very best part, in the stump.

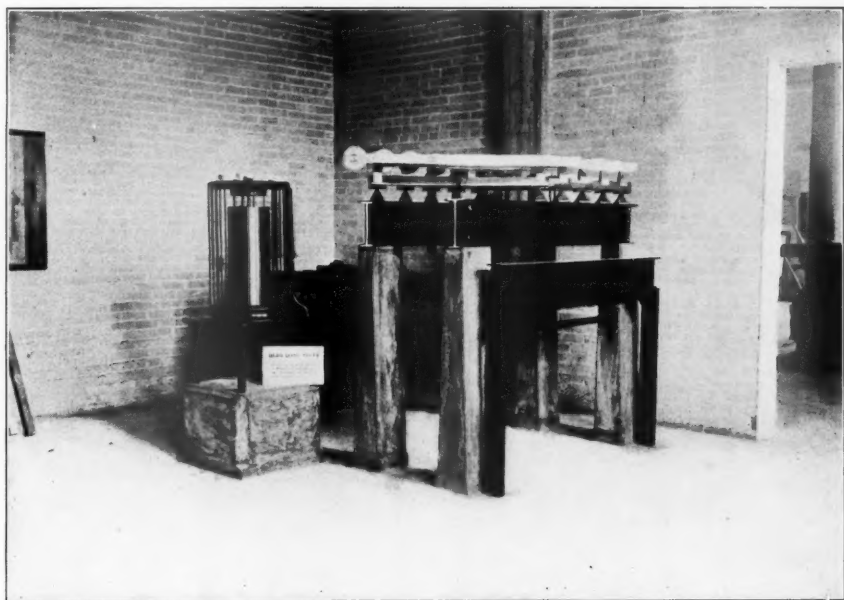
A lot of wood is wasted in the tops. Many trees are cut and felled, but never taken out of the woods, because they are in part defective. Yet they contain much sound wood. In the old white pine operations in Michigan and Wisconsin, only prime logs were taken. Lumbermen working near these old operations during the past few years found it profitable to take out a considerable number of these which still remain sound. Many logs are also lost. Some are left in the woods, but more sink into the streams. Probably as much as twenty-five per cent of the wood which is cut down in the forest is left there to decay.

Mr. Graves set forth the work and plans of the service of which he is the head, as expressed in this new realization of its ideals. His address, "The Work of the Government in Forest Products," is printed elsewhere in this magazine, as is the address of Mr. Goggins, of the American Paper and Pulp Association, setting forth the relation of his constituency to this work.

Captain White gave some instances showing the early interest of the lumbermen in the work represented by the new laboratory. Among others, he made the point, a favorite one with him, and a just one, of the cost of conservation. On this he said:

Once the farmer reaped and put nothing back for the soil. He gathered all, and the consumer got the benefit of cheap farm products. But he has now learned that he must put back into the soil the chemical food necessary to sustain it. He must add this to the cost of the product, and the consumer must pay the bill. Hence, conservation doesn't necessarily mean that through its practice everything is to be cheaper, but it does mean that all the necessities of life, with its comforts and blessings, shall continue, and that there never shall be famine, human suffering, or want caused by useless waste and extravagance.

There will be no more 10-cent corn and no more \$10 lumber. The farmer who feeds 50-cent corn to his hogs and his steers will necessarily get higher prices for his beef and bacon. And the lumberman, now that the day has passed when there was an enormous surplus of timber, when it had to be burned to make way for settlement and cultivation of the land; now that he has to conserve and grow his forest, has got to add thereto the cost of the forest growth, and the consumer will pay the bill. Yet we are each and all consumers of each other's products, and thus it is all evened up by our paying each other's bills. There is no economical



THE FOREST PRODUCTS LABORATORY

Timber Physics. Dead load testing machine

principle through which one can continue to secure to himself any product at less than it costs to produce that product.

President Van Hise spoke on conservation and on the relation of his great university to this new project with the force and cogency which his scientific knowledge and his profound convictions give to all his utterances on these subjects.

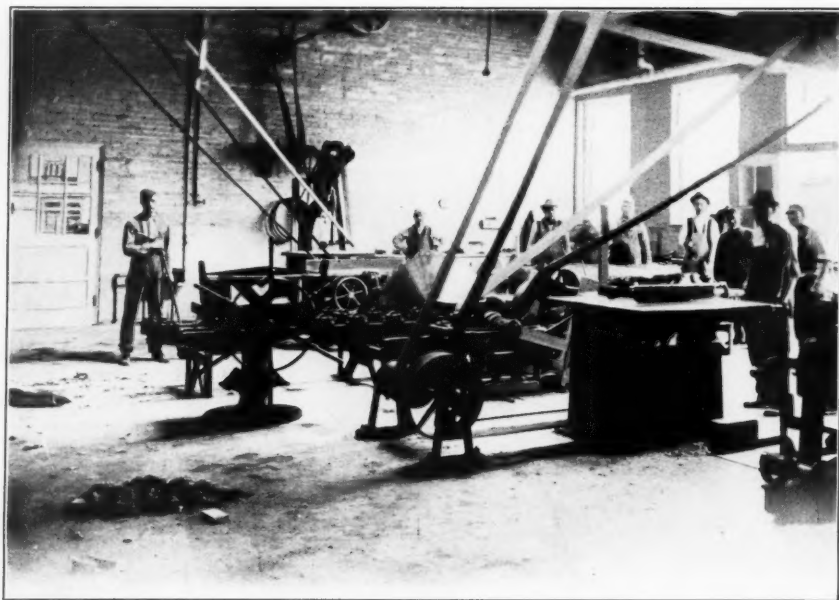
The speaking was well closed by Mr. Bannister, who aptly represented an industry that has already learned the practical business value of the work of the forest products branch, whose tests made possible the reclassification of hickory and the use of the formerly discarded red hickory. Mr. Bannister referred to this in his address.

That there was general interest in the new laboratory and great satisfaction with it on the part of the visitors no one who was present could doubt. As one cooperage man was heard to say to another after watching a dem-

onstration of the structure of different varieties of oak: "This shows us the reason for things we have simply run against in our experience without understanding them." This more perfect knowledge is certainly worth something.

THE PLANT

The laboratory is a substantial, attractive two-story brick building, 180 feet long and eighty feet wide. It was erected, and will be supplied with water, light, heat, and power by the state of Wisconsin. The United States, through the Forest Service, provides the equipment and the staff and all other maintenance. As a further evidence of the fine spirit of cooperation which is embodied here, it may be noted that the railroads are furnishing free carriage for the supplies of the laboratory, and that lumber companies and associations are giving material of great value for experimental purposes.



THE FOREST PRODUCTS LABORATORY

The wood working shop

On the ground floor are the paper and pulp mills, laboratories for timber physics and timber testing, wood preservation, and wood distillation, and the woodworking shop. The last is fully equipped with saws, planers, and all required woodworking machinery. In the rear of the building is a spur track by which timber and other supplies can be brought to the door on the car. There is also a roomy storage shed, and there are two large tanks for storing preservatives.

On the second floor are the offices of the assistant forester in charge of the branch of products, William L. Hall; the director of the laboratory, McGarvey Cline, and the assistant directors, H. S. Bristol, and H. S. Weiss. There is a large lecture room and there are offices for the computing clerks, files and other requirements of a highly organized modern business. Also on this floor are the chemical laboratories, drafting room and photographic dark room. The building is airy, well lighted, and at-

tractive—yet already the young enthusiasts of the service, who dream of to-morrows while they work at the tasks of to-day, are talking of possible enlargement in the near future. This is a healthy sign. The work grows constantly, not only in scope, but in real value as well.

THE BRANCH OF PRODUCTS

The branch of products undertakes to conduct investigations and disseminate information regarding the mechanical, physical, and chemical characteristics and properties of wood, utilization of forest products, air seasoning and artificial drying of wood, agencies destructive to wood, wood preservation, wood distillation, production of naval stores, pulp and paper and other chemical industries using forest products, chemical analyses of forest products and materials used in their treatment; statistics of production, consumption and prices of forest products, proc-

esses and waste in their manufacture and use, standard requirements, and substitutions of wood with other materials. In carrying out projects along these lines, it is required that there be a clear and definite object, method and record, for it is the part of this organization to do those things which business men need to have done but cannot do because of pressure of the immediate business of the day. Here there can be experiment, study, computation, and so full and exact a record that the results will always be of use, and available.

Forest products is not a new branch of the service, and a very complete organization and method of procedure have already been worked out. The scope and plan of the organization are shown in the accompanying diagram.

5. Wood Pulp, in charge of E. Sudermeister.

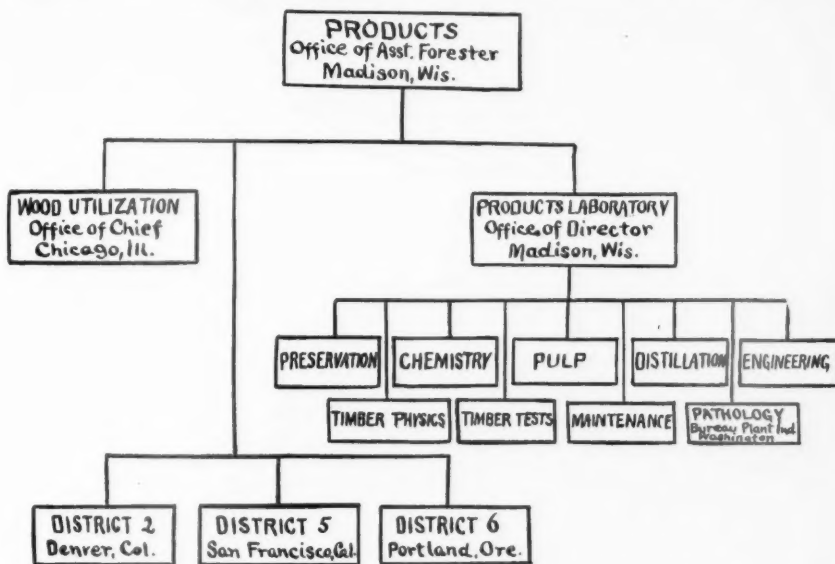
6. Chemistry, in charge of Ernest Bateman.

7. Engineering, in charge of Rolf Thelen.

8. Pathology. (This is conducted in connection with the Bureau of Plant Industry at Washington, by C. J. Humphrey.)

9. Maintenance, a non-technical section, in charge of W. K. Kempfer.

On the staff of the laboratory are four Yale men, including the assistant directors; three Cornell men, two from Purdue, two from Massachusetts Institute of Technology, two from Ohio State University, and one each from Stevens Institute of Technology, University of Maine, University of Michigan, and University of California.



The work of the laboratory is divided into nine sections:

1. Timber Physics, in charge of H. D. Tiemann.

2. Timber Tests, in charge of J. A. Newlin.

3. Wood Preservation, in charge of F. N. Bond.

4. Wood Distillation, in charge of L. F. Hawley.

An outline of the different sections, the projects that they have in hand, and the equipment with which they have to work, will give a comprehensive idea of the function of this laboratory.

TIMBER PHYSICS

It is the business of the section of timber physics to study the structural and physical properties of wood and

to ascertain how these properties are affected by different methods of drying and handling. This section has in hand at present a microscopic examination of American woods for the purpose of developing a key to their identification based on the structure of the wood; experiments to determine heat conductivity and other heat constants for the principal commercial timbers. In the kiln drying of lumber and in the treatment of woods with preservatives it is of importance to know how much heat is required, and how long it takes to heat wood to a given temperature. A third line of experiments is the study of different methods of drying wood.

The equipment of this section includes microscopes, microtomes, and other apparatus required for microscopic work, apparatus for taking microphotographs, a cylinder designed for the study of the different methods of drying wood, and an experimental dry-kiln, balancers, ovens, calorimeters, and other miscellaneous equipment.

TIMBER TESTS

In the section of timber tests studies are made of the strength, stiffness, hardness, and other mechanical properties of commercial wood. There are some very interesting machines for determining these points. Tests are made on woods that have been treated with preservatives and other substances to determine the effect of the preservative treatment upon the mechanical properties of the natural wood.

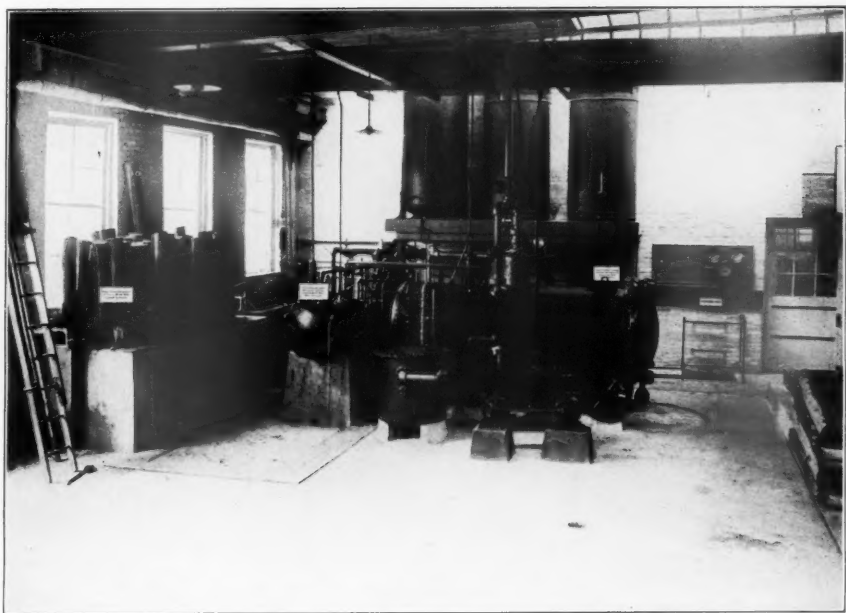
The lines of work to be taken up in this section include tests of the different commercial woods to determine their relative strength, toughness, hardness, etc. This work is of particular value to wood users in finding substitutes for woods now becoming scarce. It is the same type of work that led to the discovery which has already been referred to of the value of red hickory. Tests will also be made to determine the influence of knots, checks, and other defects used in grading structural timbers upon their

strength and other mechanical properties. The results of these tests, of course, will be of great value to architects, engineers, and lumbermen in making specifications and grading rules for structural timber. Tests will be made to determine the strength of wood under dead, impact, or repetitive loading. Such tests will assist in determining the working stress that may be used upon timber structures. One of the interesting pieces of apparatus used in this laboratory is the machine for making the dead-load test, and one of the surprising results which the record of this machine shows is that the rapidity of loading does not affect the elasticity of the wood. The mechanical properties of wood that is impregnated with creosote and other preservatives will also be determined in this section.

The equipment of this laboratory includes one 200,000-pound extension-base Reihle testing machine, one 150,000-pound extension-base Olsen testing machine, three 30,000-pound Olsen universal testing machines, one 60,000-inch-pound Reihle torsion machine, one Dory abrasion machine, one impact testing machine, deflectometers, and other instruments used in testing structural materials. Our illustrations show some of this machinery. The nature of some of the timber tests is also shown in some of the accompanying illustrations.

WOOD PRESERVATION

This is an interesting and important section. More and more it becomes necessary, in the face of a diminishing timber supply, to preserve in some fashion poles, posts, ties, and all timbers that are exposed to influences that will cause them to deteriorate. Somehow their life must be extended until supplies can be regrown. Much progress has been made in the work of wood preservation, but a great deal remains to be learned. This section is making a broad study of the problems involved. These deal with the preservatives themselves and their effects upon wood, and with the methods of impregnating the



THE FOREST PRODUCTS LABORATORY

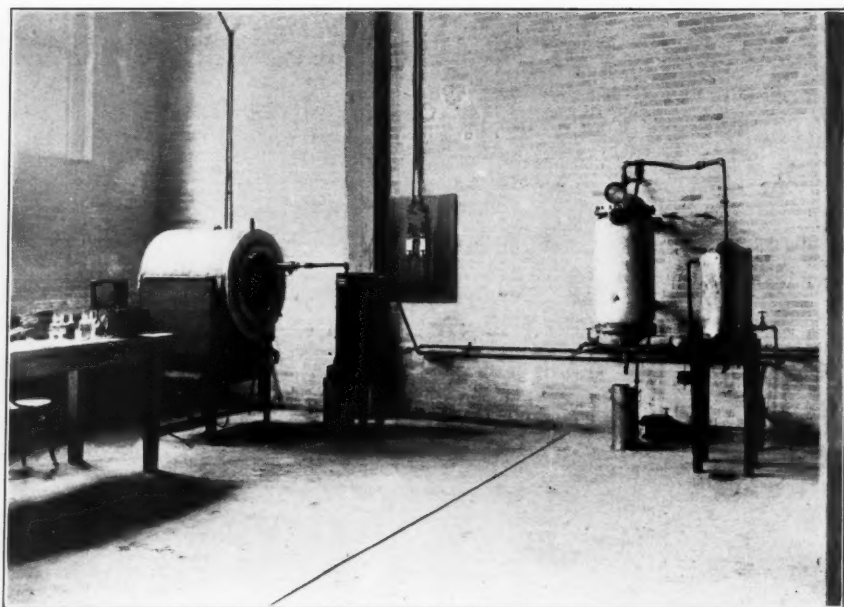
Wood preservation. Open tank treatment on the left; commercial treating plant in the centre

wood most effectively with the preservatives.

To study the first class of these problems, the laboratory is provided with a fungus pit, which contains chambers in which the wood can be thoroughly inoculated with various destructive fungi. The humidity and temperature of the pit can be regulated to produce conditions most favorable to fungus growth. Woods treated with different preservatives are placed in this pit, where they can be isolated in chambers. The efficiency of the preservative is indicated by the ability of the wood treated with it to ward off the attacks of fungi under these conditions.

The second class of problems involving the impregnation of wood are chiefly those of mechanical engineering and the plant of the laboratory is most complete in this respect. It is, in fact, a reproduction of a fully developed commercial plant. The machinery is provided for forcing any required amount of preservative into the species

and forms of wood which may be tested. This is done under high pressure, and the treated cylinders are tested for great resistance. The outfit includes one treating cylinder three and one-half feet in diameter and twelve feet in length, which will withstand a working pressure of 300 pounds to the square inch. There is also a small experimental cylinder one and one-half feet in diameter and three feet long, designed to withstand a working pressure of 600 pounds to the square inch. This apparatus is connected with a system of tanks, force, air, and vacuum pumps for handling these preservatives and forcing them into the wood. There is also an open tank outfit for the simpler treatment of butts of posts and poles, such as is practicable for farmers and others using much of this material but not enough to justify having recourse to a commercial plant. In this connection it may be suggested that time only can tell what and how much superior value the closed tank



THE FOREST PRODUCTS LABORATORY

Wood distillation

pressure treatment has over the simpler and far less expensive open tank process. The theory is, and there is no reason to doubt its correctness, that the deeper the preservative is forced into the wood the less will be the opportunity for fungi to enter. Those who cannot use this elaborate treatment, however, need not despair, for there is known to be great value in open tank treatment, or even in the application with a brush of good preservatives.

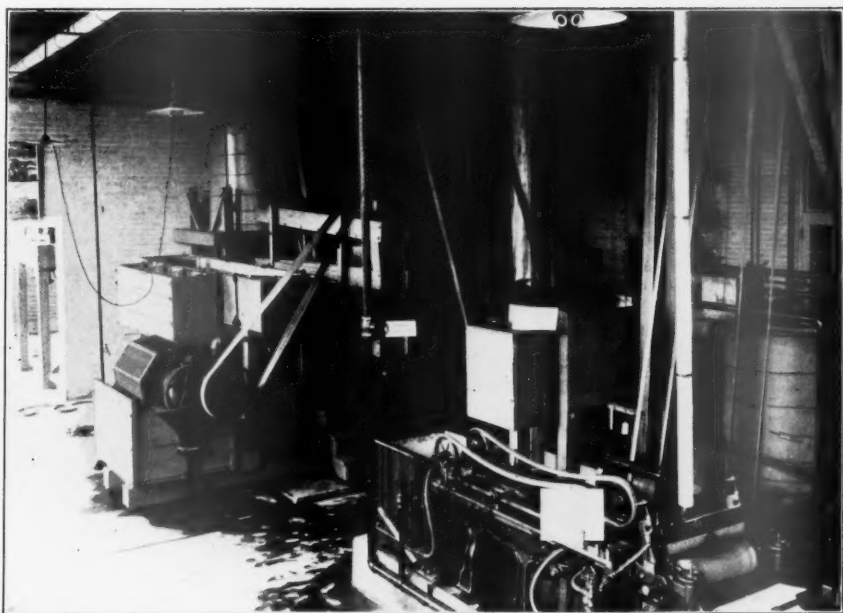
WOOD DISTILLATION

Alcohol, turpentine, wood creosote, and acetates are the present best known products of wood distillation. It is the task of this section to conduct experiments to determine what products of this kind can be secured from different woods, and the best processes for obtaining them; to study the design and operation of machinery best adapted for the production of these by-products so that they can be produced most eco-

nomically, both as to quantity and quality, and to study the refining of crude products. It is obvious to anyone who has noted the development of these industries that here is a large field for the utilization of much material that now is wasted. Already, great advances have been made, and there is no question in anybody's mind that greater still are not far distant.

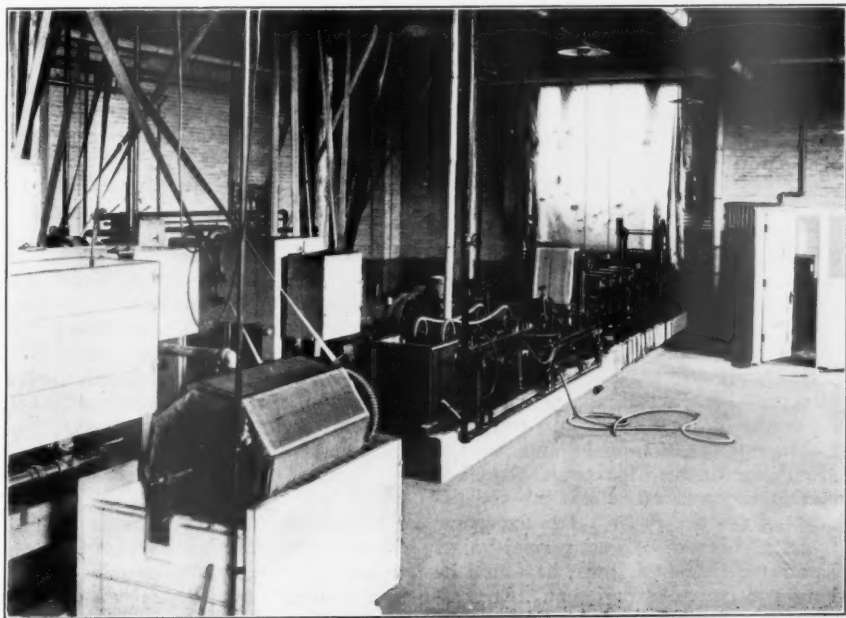
The species to be first studied are southern pine, Douglas fir, Norway pine, and other resinous woods. Already the products that can be obtained from these woods are known, but there is greater room for improvement in the methods of production and refining. The distillation of different hardwoods will also be studied. Slabs, sawdust, stumps, and all forms of mill and forest waste are material for such a laboratory as this.

The equipment includes a steam distillation and extraction retort; one oil-jacketed destructive distillation retort, and three product continuous refining still and accessory apparatus.



THE FOREST PRODUCTS LABORATORY

One end of pulp and paper mill



THE FOREST PRODUCTS LABORATORY

The pulp and paper mill, showing the little 15-inch Fourdrinier paper machine

WOOD PULP

No section deals with problems of greater interest to the country than this, and none is better furnished for its work. There is a working model of all the apparatus of the paper and pulp mill, with the exception of a mill for making groundwood pulp. This omission is to be filled at an early date. All the apparatus for making pulp by the soda and sulphite processes is here and a system of grinders and beaters, culminating in a complete Fourdrinier paper machine, making a roll of paper fifteen inches wide. This miniature of the giant machines is equally serviceable for experimental purposes, and much more economical to operate.

This section is grappling with problems of the great paper industry—problems which are growing more pressing every day. The special points of attack at present outlined are methods of making ground-wood pulp to determine whether or not commercial pulp can be made from species other than spruce; the practicability of treating different woods with the sulphite and soda processes; the qualities of paper which can be made from different grades of the various sulphite, soda, and ground-wood fibers; and the practicability of using different forms of wood waste for the manufacture of paper pulp and other fiber products. There is here a great field and one beset with difficulties such as only experimenters in it can realize. There is so much paper required by our modern civilization that to produce wood pulp by sufficiently economical processes to meet our demands for paper is entirely another question from producing it experimentally. It has been satisfactorily determined that wood pulp well adapted for many purposes can be produced from a number of annual plants, but the production of these plants and the elimination of certain troublesome constituents make the process too expensive to be at present of commercial value. The remedy for this must be found by long and patient experiment. At present the principal end in view is the

study of the utility of different varieties of wood as substitutes for the fast-disappearing spruce.

CHEMISTRY

The section of chemistry has a hand in nearly all of the problems that are presented to the branch of products. The laboratory in which the chemical analysis is performed is thoroughly equipped and arranged with great convenience, with due regard to the comfort and safety of the experimenters and to efficiency of work. Experiments with noxious gases are conducted in a glass hood so that the chemist is not exposed to the effect of the gases. The special purposes of the section are to find uses for products at present having little or no commercial value, to secure data upon which to base commercial specifications for wood products, wood preservatives, and other chemicals used in the treatment of wood, and to study chemical problems that arise in connection with the work of the other sections. In carrying out these purposes, the present lines of investigation are the analysis and grading of commercial creosote, the analysis and grading of wood turpentine, and methods of analyzing treated wood to determine the kind and quantity of preservative in it. This last is necessary to check up the results of the timber tests with the treated woods, and also to gauge the treating process itself.

ENGINEERING

This section has to do with the design of machines and apparatus to be used in saving wood waste. It is only a part of the problem to find how a given wood may be used or what products can be made from waste material. It is equally necessary that machines and equipment should be designed which will accomplish the desired results. Problems at present engaging the attention of this section are the design of an experimental grinder for the manufacture of ground-wood pulp from woods other than spruce; the de-



THE FOREST PRODUCTS LABORATORY

The chemical laboratory

sign of a dry-kiln for experimental purposes; the design of a hack for shallow chipping in turpentine experiments; the preparation of standard designs for different types of treating plants, including portable plants for the treatment of posts and poles, low and high pressure plants of varying capacities, receiving and storage tanks, gauges and accessory apparatus, plans for the general arrangement of equipment and for yard storage and transportation. The importance of this task will be understood by those who are aware of the fact that it is just this development of a satisfactory economic plant that many of the larger electric companies and railways which are deeply interested in preserving timbers are waiting for. The section of engineering has charge of the woodworking and machine shops in the laboratory.

The remaining technical section of the branch of products is that of

PATHOLOGY

This section investigates the diseases which cause the decay of wood. Its work is closely allied with that of wood preservation, and the problems will be of the same kind, although the work of the two sections will be entirely distinct. The work in forest pathology is conducted in the bureau of plant industry of the Department of Agriculture in Washington, and that bureau provides the working staff and has charge of the technical methods.

THE OFFICE OF WOOD UTILIZATION

An important division of the branch of products is the office of wood utilization in Chicago, in charge of Homer S. Sackett. This office takes up the problems of the branch of products

which do not require laboratory work, those which can be solved by cooperative studies with the manufacturers, or which can be worked out by statistical study. The question is sometimes asked why this office is located in Chicago. The answer is in a sense an explanation of the nature of its work. Chicago is not only central, but it contains every industry that is concerned with forest products. When any information is needed in regard to the results and requirements of any industry, Mr. Sackett can get into communication with representatives of that industry without delay. Seventeen of the great wood-industry organizations have secretaries or managers in Chicago. Chicago is the greatest lumber and wood-manufacturing center in the country. These are a few of the most cogent among many reasons for the establishment of this office here.

The nature of the work of this office is suggested by some of the projects at present on the program. A report has already been made on the vexed question of odd lengths. This shows that in the yellow pine district of the south one and twenty-one one-hundredths per cent of the products of the planing mill are wasted annually because of the non-manufacture of odd lengths. This entails a loss of about \$600,000. The report urges the manufacture of odd lengths with some concession to the buyer.

Samples of red cedar, alligator juniper, western juniper, redwood, incense cedar, western red cedar, Port Orford cedar, and Alaska cypress from the national forests of the Rocky Mountains and mountain cedar from a private forest in Texas have been furnished to four of the largest pencil manufacturers of the east, and they will give them a thorough trying out for pencil manufacture. A report is about due on this work. In a similar way, several western woods are being sampled for the manufacture of shuttles. With the assistance of manufacturers of butter and tobacco boxes, a test is being made of

short lengths of cypress for these purposes, and of incense cedar for tobacco boxes.

At the request of the National Hickory Association, a study of better methods of utilizing hickory will soon be begun and is expected to occupy about four months.

Studies are being made of markets and market reports; and statistics of consumption have been gathered in cooperation with Massachusetts, North Carolina, Kentucky, Wisconsin, and Maryland. The service alone has gathered the statistics for Illinois. These reports are of great value. "They show what part of the total demand, and of the demand for each species, is met by forests and woodlots in the state, and what part is supplied from without. The kinds of wood demanded by the various industries are shown, together with the amount of each species used, the prices paid at the factory, and into what product each wood is manufactured. With this information before them, the woodlot owners who are looking to the future can determine what kinds of timber promise best returns and can give preference to those kinds. Those who have timber or lumber to sell can form an intelligent opinion as to where the best market can be found for what they have to offer. On the other hand, the manufacturer who is in the market for woods of certain kinds, will have the means to determine whether he can buy near home or whether he must look beyond the state; and a study of average prices paid by others will show whether or not he has been buying on an equal footing with others."

The Massachusetts report is printed, by that state, and those for Wisconsin, North Carolina, and Maryland are in type. These studies will be continued the coming season in Louisiana, Michigan, Missouri, and Pennsylvania.

The office also gathers statistics of cost and prices, giving data not heretofore available in any form.

The office has taken up the question of fiber and wood boxes. While be-

lieving that fiber as a box material has its place, and has come to stay, Mr. Sackett has reached certain conclusions under which he regards wooden boxes as more desirable for general use under present conditions. As an element in conservation, fiber has the same drawback as wood pulp, for since everything can be used its adoption on a large scale tends to more complete forest destruction. The question is now being taken up by the National Box Manufacturers' Association and National Lumber Manufacturers' Association. Accurate information is sought on the amount of business lost by wooden box manufacturers, and on the character of the material going into the fiber, whether mill waste or material that should go into high-grade lumber.

These few examples illustrate the wide range of inquiries continually opening before this office, which, through close relations with the manufacturers, can do much to promote the most complete and economic utilization of all the products of forest and mill. It is the business of the office to show the manufacturer how he can add to the profits of his business by reducing waste and economizing production.

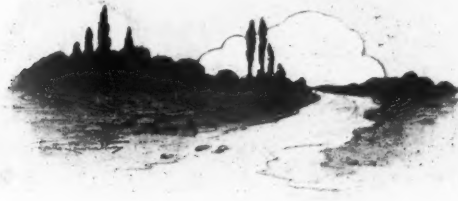
CONCLUSION

For several days following the opening of the laboratory, the heads of the sections and divisions of the branch of

products from all of the different offices were in conference at Madison, with the purpose of developing their program and organizing their work so as to take up slack all along the line, cut red tape as much as possible, and bring the methods of their branch up to the highest standard of business efficiency. In the systematic methods and the actuating spirit of this conference, with its strong *esprit du corps*, there is something admirable and full of assurance for the future of the great work entrusted to this group of young men.

The fact cannot be too strongly emphasized that the new laboratory, as well as every office of the branch, wherever located, is national in its work and outlook. Removal from Washington does not localize it in the least. In fact, it broadens the outlook, inasmuch as it takes it out of the official atmosphere of the national capital, right among the people who are doing the work with which its activities are directly concerned. Through its several offices, it reaches into all parts of the country, touching the users of wood at all points, and supplementing with its admirable facilities for experiment the daily practical experience of business.

The new laboratory is the most extensive and best equipped of its kind in America, and probably in the world, and it is in the hands of a group of men qualified to make good use of it in the country's service.





HENRY S. GRAVES

Forester, of the United States, and one of the chief participants in the opening of the new laboratory at Madison

THE WORK OF THE GOVERNMENT IN FOREST PRODUCTS

By HENRY S. GRAVES, Forester of the United States

An address delivered at the opening of the Forest Products Laboratory, June 4, 1910

THE United States is now facing the problem of forest conservation which must be solved by every country some time during its history. The original American forests were unexcelled anywhere in the world. Not only did they cover a vast area, but they were characterized by trees of great age and size, and by an unusual variety of valuable species. Heretofore we have drawn chiefly upon the original supply of timber, and the bulk of the lumber used in this country to-day is still from trees over 150 years of age. In spite of the rapid rate of cutting and the destruction of forests by fire, ample supplies have been made available by the opening of new regions through the extension of railroads and through the development of logging engineering. The process, however, cannot be continued indefinitely. Already the end of the virgin supply of timber is clearly in sight, and all thoughtful men who are familiar with the conditions appreciate that there is before us a problem which very profoundly affects the welfare of the country.

The problem of forest conservation must be worked out from two standpoints; first, by securing the greatest possible economy in the utilization of forest products, and, second, by producing new supplies through forest growth.

At present, there is a great loss in the utilization of forest products, and the production of new supplies is entirely inadequate to meet the requirements of the people in the future. Within recent years great progress has been made in the protection of forests

from fire. The loss from that source has been greatly reduced, although there is still an enormous amount of destruction of young growth by fire, and in some sections fire has almost entirely prevented forest reproduction. One of the most important aims of the forestry movement has been to bring about not only the protection of standing timber from fire and other agencies, but also the replacement of forests as they are cut and the establishment of new stands of timber on denuded lands.

Forestry, however, does not stop with the growth of trees. It concerns itself equally with the disposal and utilization of the products. The two branches of forestry, forest utilization and forest production, are inseparably related. The market for products is one of the factors most controlling the selection of species to be grown and the methods of handling woodlands for forest growth. The study of forest products is, therefore, one of the most important lines of work of the Forest Service.

The fundamental purposes of the work of the Service in products are, first, to bring into use the greatest possible amount of the products of the forests with the least possible waste, and, second, to place these products to their best use. In other words, the Service aims to aid in making the material which can be obtained from the forest meet in the highest degree the real requirements of the people. This broad principle is the foundation of the work which will be done at and in connection with this laboratory.

In its work in products, the Forest Service keeps in view two objects:

First, direct aid to the various wood-using industries, and second, forest conservation in its broadest sense.

The interest, cooperation, and support given to the Service by practical men engaged in different industries is proof of the appreciation of the work in products which has been done and is projected.

The science of forestry in this country is at its very beginning. While the American species of trees are well known botanically, the study of their life-history, their behavior in the forest, and their possibilities of production has only recently made much progress. It is equally true that our knowledge of the products of the various species is still very inadequate.

The first necessity is to determine the fundamental properties of the various woods. This information is essential as a foundation for the study of the suitability of the different species for specific uses. At the present time there are many species which are little used or not used at all because of ignorance of their properties or prejudice against them. Many of the common commercial species are for the same reason confined to only a few of the possible uses. It is the aim of the Forest Service to show the possibilities of all the species and to demonstrate the uses to which each is best adapted.

The demonstrations at the laboratory to-day have illustrated many of the special lines of work and the methods of conducting the investigations. You have seen the methods of studying the fundamental physical, mechanical, and chemical properties of wood.

A further aim of the work at the laboratory is to study the methods of handling wood products so as best to adapt them to certain purposes. Studies will be carried on at the laboratory to show the behavior of the various woods under different conditions. One of the important problems is to determine the influence of different conditions of moisture on the strength, durability, and other characteristics of wood. This work will form the foundation for the investigation of the best methods of seasoning wood in order to bring the

products into the market in the most suitable condition for their various uses.

The next problem is the study of how to treat wood products so as to improve their natural qualities. One of the most important lines of work at the laboratory will be the study of the treatment of wood to prolong its life. There is required in the first place a thorough study of the various preservatives. Then follows the investigation of the methods of treating the different species with reference to their peculiar specific characteristics.

There are a multitude of problems of wood utilization, but among the most important are the investigations of the possibilities of the different species for the manufacture of paper, and the study of the by-products which can be obtained by various processes. The laboratory is especially equipped to make these investigations.

I have given special emphasis to the fundamental and scientific character of the work to be done at the laboratory. Every investigation, however, is directed to the solution of some practical problem. Many experiments are conducted at the laboratory on a commercial scale, or commercial tests are made in cooperation with private concerns. In many cases, the work at the laboratory is supplemented by extensive field experiments. Through cooperation with private companies and trade associations, the investigations will not only be brought into the most practical lines, but the results will be given an immediate application.

The branch of forest products has been established at Madison. The laboratory is the center of its work. It concerns itself, however, with the whole field of forest utilization. There are special branches of its work in the various districts of the national forests of the west, and there are two subsidiary laboratories, one in the state of Washington, and one in Colorado. It is the design to bring the work into the closest relation with all the wood-using industries. The determination of the fundamental facts and principles of wood-utilization is the first step. To secure the practical application of those

principles requires the assistance and cooperation of all those interested in them in a practical way.

There has been a most gratifying cooperation with the Forest Service by the different railroads, lumber companies, paper companies, woodworking concerns, and trade associations. I wish to take this occasion to express the appreciation of the Forest Service for this cooperation and assistance.

From the standpoint of conservation, the work of the government in forest products is of great importance. When one examines the losses in the utilization of wood products, one finds that these begin in the woods. Many species are not cut at all; often the trees left uncut deteriorate rapidly, or are blown over, or are injured in logging; frequently long tops containing a large amount of low-grade lumber are left in the woods; and many logs only partially defective remain on the ground. The cause of this seeming waste is the condition of the market. The lumberman seeks to take out only what he can dispose of at a profit. It is to his own interest to take out of the woods just as much as he can possibly utilize, because every increase in amount of marketable material removed reduces the cost of production and increases profits. The amount of waste in the woods is therefore definitely governed by market conditions. In exactly the same way it is the condition of the market which causes a great loss in the manufacture of lumber. Close utilization follows good markets.

It is the market, also, which most powerfully influences the problem of forest production. The better the market, the greater is the value of the timber; an improved market means a correspondingly increased inducement to protect the forests from fire; there is an increased value of immature and young growth; and a correspondingly greater justification for investments in holding and protecting cut-over lands for the production of new stands of timber.

The work of the Forest Service in products will have a direct influence in the long run on market conditions. The

development of new uses of wood will bring into the market species and grades not before merchantable. The uses of wood for by-products will reduce waste and enable the lumberman to use material now frequently left in the woods or wasted at the mill. The extension of the use of treated timber will enable the marketing of the less valuable species for uses now requiring the most valuable. There will thus be a constant tendency to extend the market and to decrease the loss in utilization all along the line from the stump to the manufactured product.

There are, however, other factors influencing the market which will not be directly touched by the investigations at the laboratory. These factors must not be overlooked in the consideration of the relation of the market for forest products to conservation. Problems connected with the methods of logging and manufacture of lumber, grades and sizes of lumber, rates for low-grade lumber, the car-stake question, etc., concern conservation. In some of these problems, the Forest Service can be of assistance through its work of products.

One of the most serious problems, however, in the whole realm of forest conservation is that of over-production of lumber. In some sections of the country more lumber is being manufactured than is needed. There is, in consequence, a poor market for the lower grades and a great deal of waste in the woods and at the mill. From the standpoint of conservation, the condition would not be so serious if the forests were being replaced after cutting. But the conditions which lead to waste in utilization prevent, also, the practice of forestry. There is, then, a double loss—waste of the present resources and prevention of the production of new resources.

I doubt if this situation can be met at once or by the application of any one remedy. It is clear to my mind, however, that in this case, as in other conservation problems, there must be some present public investment for the future welfare of the country. This investment will take two forms: First, an increased price of products which must

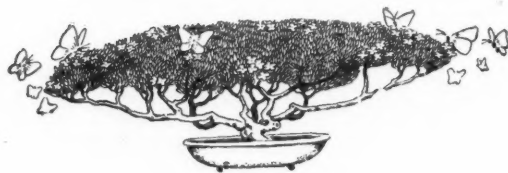
approach the cost of producing these by growth, and, second, direct investment in public forests and forestry. So far, the public has not appreciated this condition. There have been public appropriations for the administration of the federal forests, but the various states are not now making the investments necessary to solve their local problems of forestry; the general public is apparently not yet prepared to pay more for the products in order to cover the cost of conservation. One of the first necessary steps is public education regarding our resources and the conditions of their utilization. A better appreciation by the public of the conditions of forest production, logging, and manufacturing of lumber is essential to work out this phase of conservation and bring about a proper adjustment between the limited resources and the needs of the people.

I have felt justified in calling attention to this problem because it is very closely related to the work of forest products and the application of the investigations in this branch of the Service.

As I have only recently become connected with the Forest Service, I feel that I can speak without reserve in praise of the work which has been un-

dertaken. I wish especially to compliment the work of Mr. Hall, Mr. Cline, and their associates in their work of forest products. I wish at this time to express my deep appreciation of the support and cordial cooperation of President Van Hise, and other authorities of the university who have made possible the Forest Products Laboratory.

I regard the cooperation with the university of the greatest value. It is not only in the general educational work in forestry that the Forest Service will be greatly aided, but the association with the university will be very valuable in the conduct of the scientific work at the laboratory. We wish to maintain among our workers that spirit of search after truth which characterizes this great institution. The science of forestry is still in the creative stage. A great deal of the research and of the work of establishing the practice of forestry must be done by the government. To carry on this work, I consider it of the greatest importance that there be no lessening of that spirit of individual initiative, personal responsibility, and high ideals which has characterized the members of the Service under the inspiration of Gifford Pinchot.



SOME EXAMPLES OF TIMBER TESTS

THE cuts on the five succeeding pages illustrate very clearly the nature and the methods of some of the work done in one department of the forest products laboratory—that of timber tests. Machines of great simplicity, but efficiency, have been devised for determining the strength of wood under different kinds of strain.

Figure 1 shows a bridge tie of western yellow pine which was broken by the blow of a 515-pound hammer falling twenty inches.

Figure 2 shows a similar piece of timber which sustained under gradual loading a maximum load of 2,380 pounds, concentrated at two points equally distant from the center and one-third of the space apart.

Figure 3 shows a white pine packing box which sustained a maximum load of 1,370 pounds, applied at diagonally opposite corners. This box was eighteen by twenty by thirty inches in size.

Figure 4 shows the manner of testing hickory buggy spokes.

Figure 5 shows the results of torsion or twisting tests upon sticks of red gum and four commercial grades of hickory.

These tests were made some years ago, but they are typical of the work done in the section of timber tests. With the new equipment, the section will be able to do a much more comprehensive work in the future.

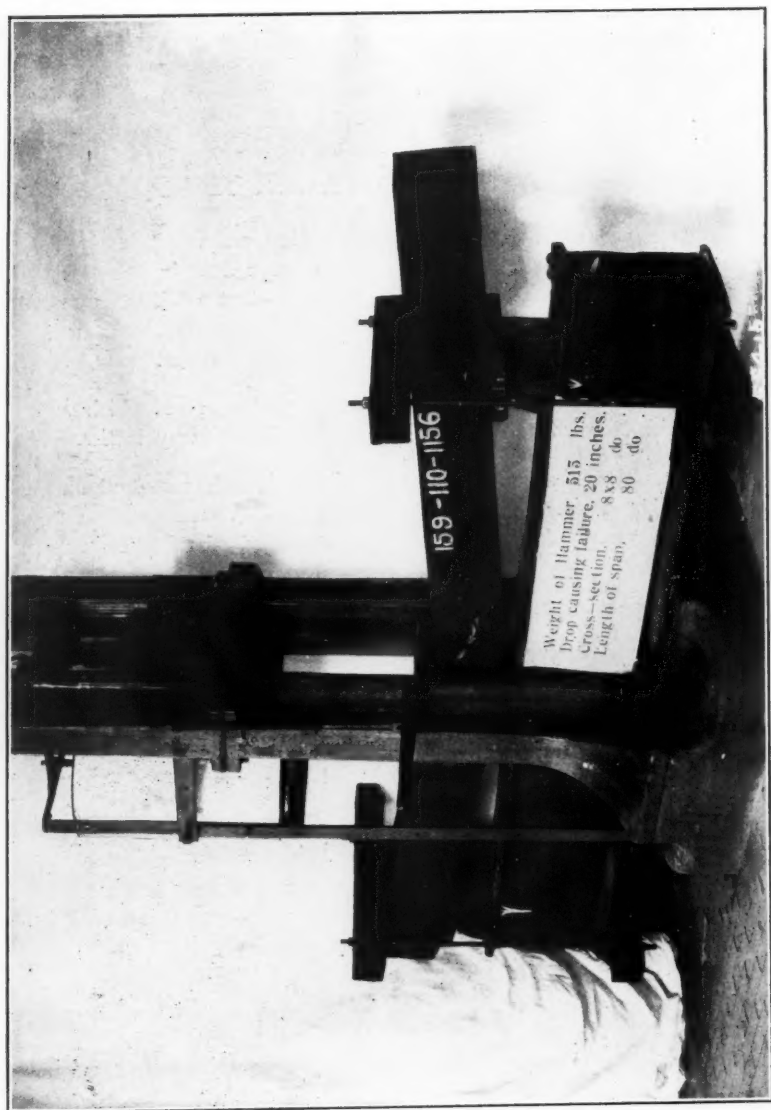


FIG. 1 - Testing a yellow pine bridge tie impact loading

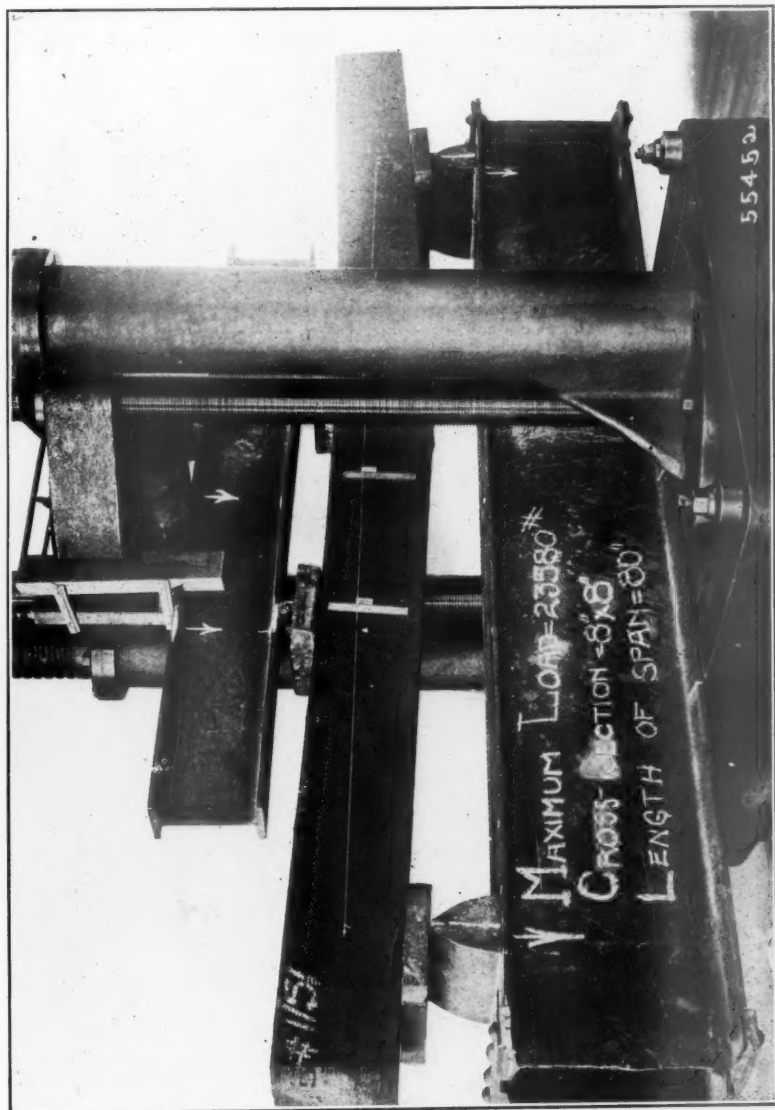


Fig. II—Testing a yellow pine bridge tie; gradual loading, load applied at third points

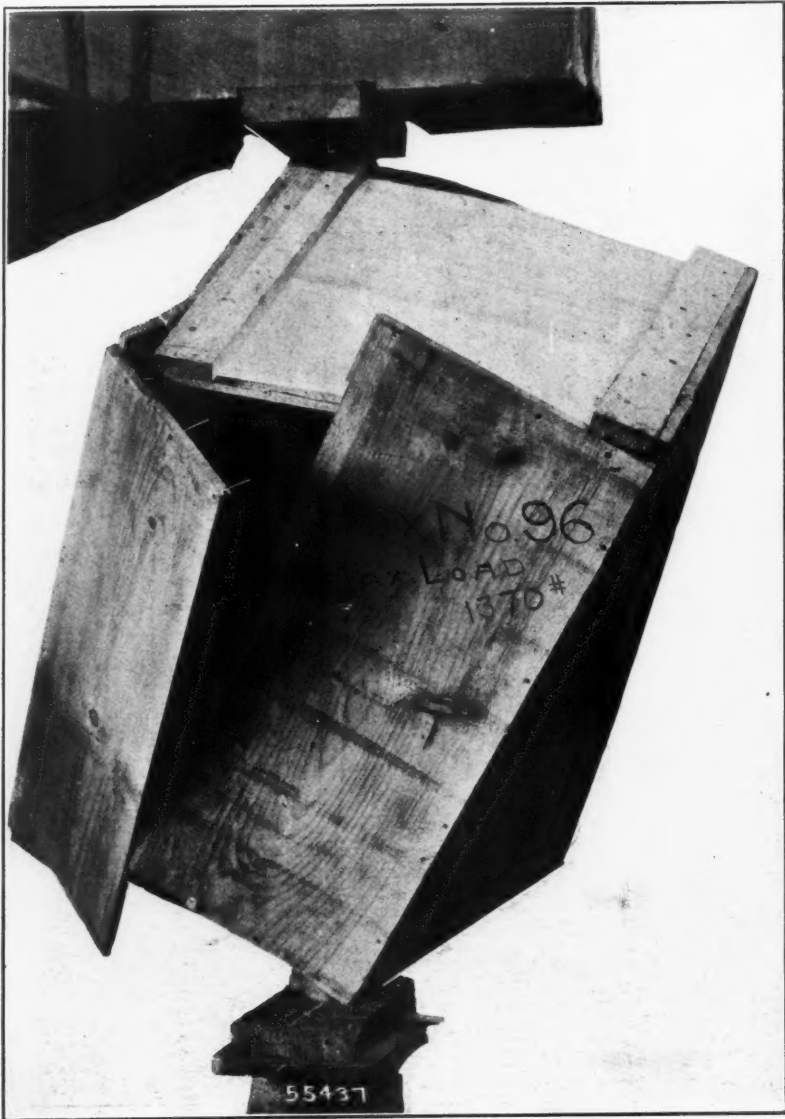


Fig. III—Testing a white pine packing box; gradual loading

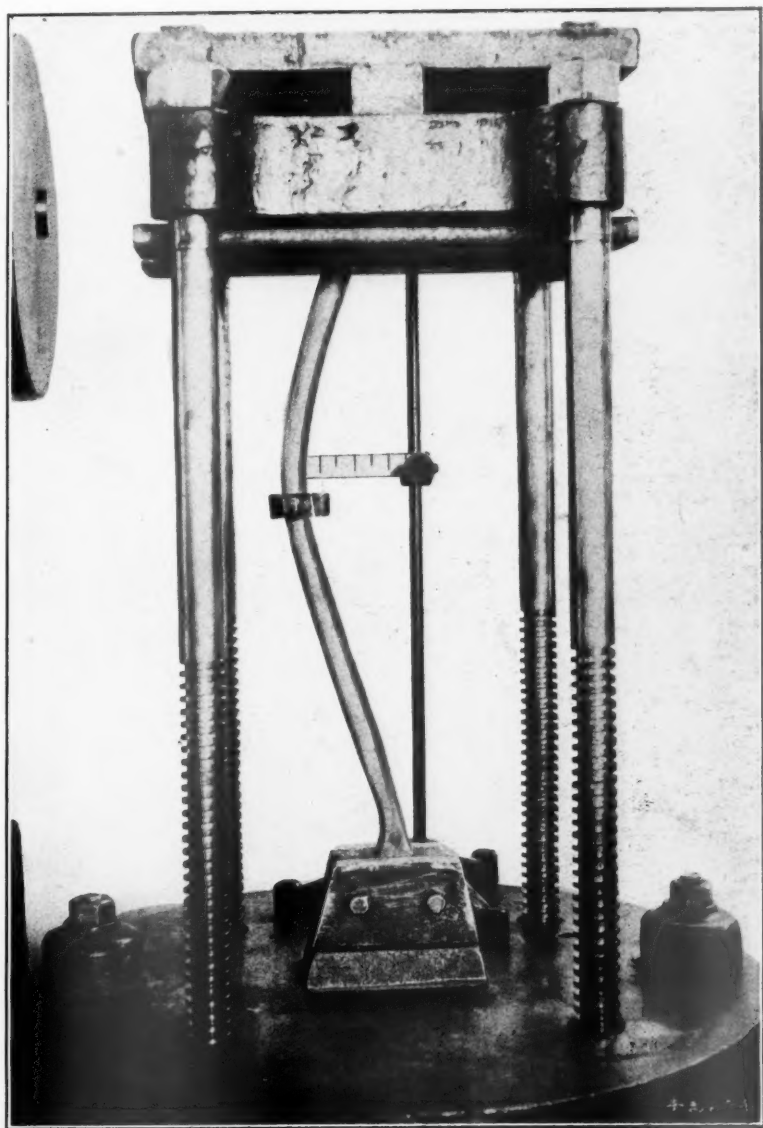


Fig. IV--Testing a hickory buggy spoke

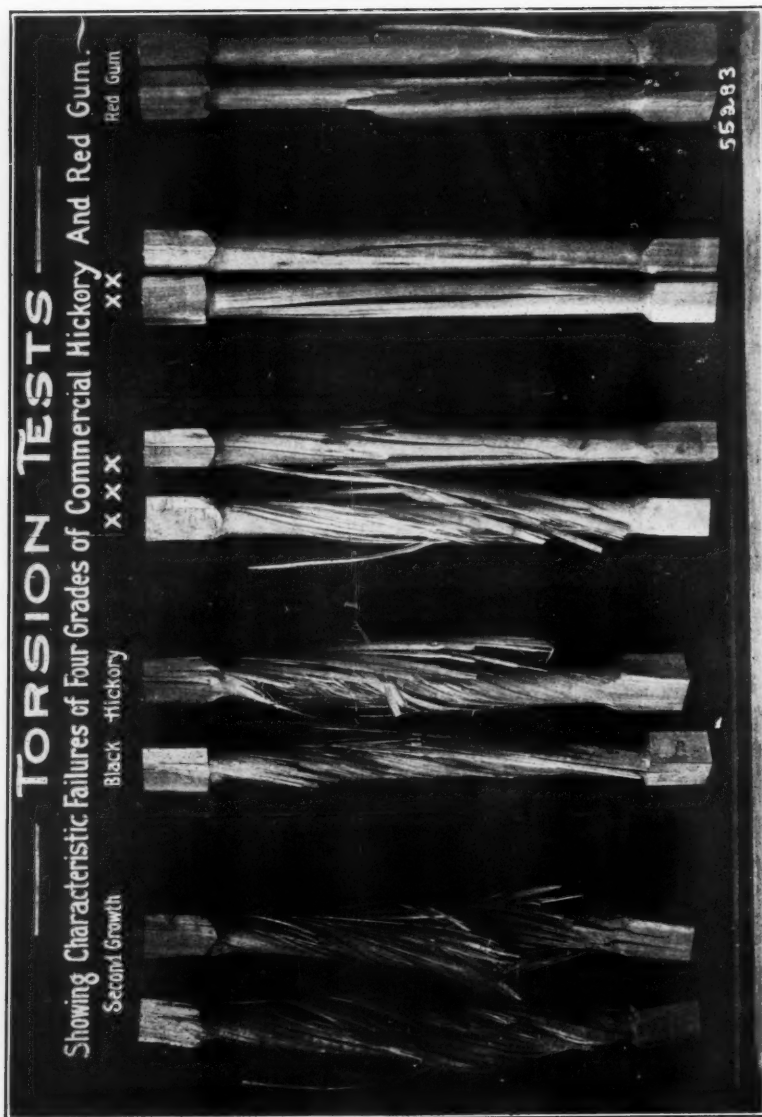


Fig. V—Results of torsion or twisting tests upon sticks of red gum and four commercial grades of hickory

THE PAPER AND PULP INDUSTRY AND CONSERVATION

By B. R. GOGGINS

An address delivered by the author, representing the American Paper and Pulp Association at the opening of the Forest Products Laboratory, June 4, 1910

IT IS gratifying to the paper and pulp manufacturers of this country that the paper industry is specifically included within the purposes of this institution.

Wisconsin is the greatest paper-making state of the middle west, and ranks third in the Union. Its location, the extent and variety of its forest products and other natural conditions make it fairly typical of the paper-making sections of the United States and an ideal location for this Forest Products Laboratory.

Wisconsin's seventy-five mills, owned by forty-five different concerns, manufacture annually 459,000 tons of paper, 264,900 tons of groundwood pulp, 216,000 tons of sulphite pulp, or a total annual product of 939,900 tons, requiring annually for the production of such groundwood and sulphite pulps (480,900 tons), 300,000 cords, or 645,000 tons of spruce, and 540,000 cords, or 1-, 350,000 tons of hemlock.

Thirty years ago, as compared with to-day, but little paper was made or used in this country. At that time, little or no groundwood pulp was made, and no chemical pulp at all in the west. Commencing shortly after that time, groundwood pulp from poplar was made and used on a small scale, and within the next ten years, owing to its superior quality, groundwood pulp from spruce was largely used.

About twenty-five years ago, sulphite pulp came into use in a very small way, and for a number of years was made entirely from spruce; but, as this timber became scarcer, hemlock came into

use for this purpose and has since been used therefor with success.

Less than twenty-five years ago, paper-makers of Wisconsin regarded the supply of spruce in this state as inexhaustible, but it grows sparsely and mixed with other timber, and in a few years they were undeceived, and for some years past have been forced to look to Minnesota and Canada for a supply of this timber.

An important progressive step was the combined use of sulphite, manufactured from the more plentiful hemlock, with groundwood pulp from spruce. But, notwithstanding our vast forests of hemlock and spruce, it soon became apparent that without provision for new growths and use of other kinds of timber or vegetation, the supply of both hemlock and spruce would in time become exhausted. And as they have become less in quantity, their cost has greatly increased. Within the last twenty years for a considerable period the price of spruce pulp wood of the best quality, delivered f. o. b. cars at points in the Fox River Valley, Wisconsin, ranged from \$4.50 to \$5 per cord. Now, a comparatively inferior quality runs in prices from \$10 to \$11 per cord. Hemlock, then practically without value, now ranks even higher than spruce did at that time.

Thus far, the production of pulp, groundwood or sulphite, has been practically confined to spruce and hemlock. Theoretically, there is no reason why any plant of the vegetable kingdom having fiber cannot be converted into pulp suitable for the manufacture

of paper. In the timber belts of this country are many kinds of wood in great quantities, and upon its soil are annually grown to maturity many plants which, it is believed, will be used in the manufacture of paper by processes yet undiscovered. The planting and growing of new forests is already an assured fact. Thus will be brought to the paper industry an inexhaustible supply of raw material from farm and field and from forests now grown and growing and forests hereafter to be planted and grown.

A cord of spruce, weighing about 4,300 pounds, yields on the average, by present methods employed, 1,700 pounds of groundwood pulp, or thirty-nine and fifty-three one-hundredths per cent of its weight. A cord of hemlock, weighing about 5,000 pounds, yields in sulphite, 800 pounds, being further reduced in the process of converting it into paper to 727 pounds, or fourteen and fifty-four one-hundredths per cent of its weight. Therefore, in converting spruce and hemlock into paper, there is at present a direct loss in material of sixty and forty-seven one-hundredths per cent and eighty-five and forty-six one-hundredths per cent, respectively.

This illustration is sufficient to show the great loss of raw material in the manufacture of pulp and paper by the processes now known.

As yet, no successful method for producing suitable groundwood pulp from hemlock has been discovered.

What a wonderful saving in raw material there would be if a way were found of producing from hemlock groundwood pulp equal in weight and usefulness to that now derived from an equal weight of spruce! This alone would more than double the present pulp product from hemlock.

What a wonderful addition there would be to the raw material for use in paper manufacture, should ways and means be discovered for use of the many other kinds of wood, cornstalks, and the numerous grasses found and grown in plenty in this country. Wealth

is always increased to the extent that waste is prevented and new sources of supply discovered.

In this respect the paper industry is no worse off than any other. Man's ways and devices for reducing to usable form the things which nature has provided in such abundance for his happiness and comfort have usually been too crude and wasteful. He thinks seriously of efficiency and saving only when he can see the end of what he theretofore regarded as an inexhaustible supply. It has been by one competent to speak, truthfully and timely written that:

"Nature's operations are characterized by marvelous efficiency and by lavish prodigality. Man is a child of nature as to prodigality, but not as to efficiency. If it had happened the other way—if he had followed nature's lead as to efficiency, but had taken up parsimony as a distinctly human virtue—the human race would have become wealthy beyond conception."*

So, till very recent years, the people of this country, blessed with everything that goes to make a great people prosperous and happy, rested on the assumption that its mines and forests were practically inexhaustible. *They now know better, and the great problem of the day is to reduce to a minimum the waste in the present ways of converting raw materials into product fit for consumption, to bring into serviceable, economical use everything that nature produces, and to provide ways and means for the reproduction of that which has been consumed.*

Timber has, and will continue to have, a multitude of useful purposes. However, while buildings, bridges, and other structures will in increasing numbers and proportion be hereafter constructed from stone, brick, cement, iron, and other like materials, thereby lessening the claims on our forests for such purposes, resort must ever be had to the vegetable kingdom for materials out of which to make paper.

*Harrington Emerson in July, 1908, *Engineering Magazine*.

There are thus here pointedly presented to us overpowering reasons why the paper industry should be specifically included within the purposes of this great institution. And it is fitting that such purposes should include the discovery of ways and means for the production, if possible, of a suitable grade of groundwood pulp from hemlock and other kinds of wood than spruce; for the use of cheaper, more plentiful, and more quickly grown kinds of wood for use in the sulphite, soda, and sulphate processes; for the production of suitable pulps from cornstalks, the different grasses, and like vegetation grown annually; for the saving and use of mill waste from pulp and fiber manufacture; for the material increase of the amount of pulp of all kinds from the raw materials.

People engaged in the productive industries, no matter how great their inclination, have not always the leisure, means, or training necessary to work out to the best advantage methods and means for getting the most out of our natural resources. And it is because of this fact, among others, that the national government wisely here assumes one of its greatest and most beneficial functions; for the nation which most economically and beneficially uses its natural resources must longest endure in happiness and prosperity. The united harmonious labors of the government's experts and the people practically employed in the industries must necessarily be productive of the most satisfactory results, for the highest success must necessarily attend upon the union of scientific experiment with practical application.

Paper-making is an important and great industry. No other article, to my mind, has so many varied and extensive uses. It has become a necessity of everyday life and has been and must continue to be identified with the advancement of civilization. In the sense of the use of raw material from the forest, it is a new industry. It is but twenty years since the first paper was manufactured on the Wisconsin River, the present seat of a large part of the

Wisconsin production. Nine hundred ninety-six mills, representing an investment of \$350,000,000, are now engaged in the manufacture of pulp and paper in this country, yielding an annual product in value \$250,000,000. In Wisconsin alone the direct investment in the industry is about \$30,000,000, distributed in ownership among over 3,000 persons, with over 7,000 persons directly employed therein, producing annually paper in value \$23,000,000. About these mills have grown up thriving cities and villages dependent upon this industry for support. This does not take into account the thousands of persons engaged in the preparation of the wood in the forests and in transportation of the raw materials to the mills and the finished products therefrom to the market. It is safe to say that no other article in common use by the people has been furnished to them so cheaply and has increased more slowly in cost to the consumer, despite the great advance in cost of raw materials and labor.

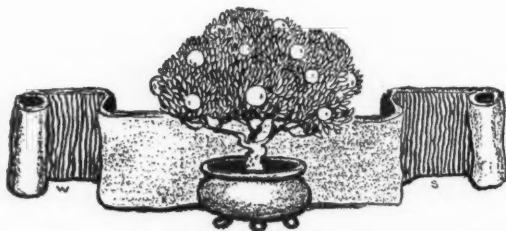
Neither is it a decadent or dying industry in this country, and, generally speaking, never will be in the localities where it is now made.

The fact that the people of this nation must continue to have paper is, in itself, a reason why it should never become a decadent industry in this country. Combined with such necessity is the great economic reason that it requires great power and great quantities of raw materials in fairly close association with each other. In Wisconsin alone there is estimated to be 160,000 horse-power of water-power employed in this industry. This country had at the start great areas of the finest forests, including about all the kinds of timber indigenous to our latitude. While its spruce is much depleted, it yet has great quantities of hemlock. Its still greater quantities of jack pine and other kinds of timber and other mentioned probable sources of supply, it is confidently believed will, at no distant day, be made available to this industry. It has great stretches of land which can and will most profitably be, and are now

to some extent being devoted to a new growth of timber.

Some have thought that the paper industry must shortly die here and be transported to Canada. This is a mistake. The quantity of timber there available for the purpose is less than some time ago supposed, and its water-powers, on account of the greater cold, are less efficient than our own. Its supply of timber would and will, unless renewed by the very means by which our supply can and will be perpetuated, soon be exhausted, and what then? The necessary reestablishment of the industry in our own country. With our water-power in such large amount and improving efficiency, and our present supply of raw materials and facilities for the production of more, I believe that this important industry will forever remain with us and continue to supply paper to this country at less cost than if the industry were transferred to some other land. Tariffs have been considered necessary to the establishment of industries for the production of things of prime necessity to the people. The continuance of such tariffs is often more necessary to the con-

tinuance of the industry thus established. But more important for the permanent welfare of the people is the direct, energetic, and intelligent application by the government of scientific thought and effort to the discovery and application of ways and means by which to reduce to the minimum loss in raw materials in the process of converting them into forms suitable for use, the discovery of new sources of supply, and to the replacement of what has been consumed by new growths where possible; for thereby such industries, however established, dependent on such raw materials, are perpetuated to the everlasting benefit of the people. For such purpose, in one department, is this institution established and to-day dedicated. The principle of conservation of natural resources can have no truer or more beneficial application. In this work, no class of producers feel and have a greater interest than the paper and pulp manufacturers of the whole United States. Their loyal, active support and cooperation will never be found wanting in this important undertaking.



TENNESSEE RIVER IMPROVEMENT AND SEDIMENTATION

A reply to the testimony of Capt. Edward N. Johnston, U. S. Army, before the House Committee on Agriculture, on March 2, 1910, when considering the Weeks Bill

By L. C. GLENN, Ph.D., Professor of Geology, Vanderbilt University

AT SEVERAL hearings in recent years before the Committee on Agriculture of the House of Representatives, the writer has given testimony as to the harmful effect the material eroded from the steep head-water mountain slopes of the Tennessee River Basin is to-day having on the navigable portion of that stream.

At the hearing on March 2, 1910, in response to an invitation extended by the committee to the army engineer's office, for information on the same subject, Capt. Edward N. Johnston appeared as the representative of that office. After being questioned by the chairman to develop for the committee the fact that he was "familiar with the reports and the literature on the subject"—not only published but unpublished—Captain Johnston said, in beginning, that there had developed among the engineers of the corps "a feeling of irritation at the fact that certain parties interested in forests, or others, have deemed it necessary to criticise the methods which have been followed up to the present time in the improvement of streams by the engineer department. Our hair bristled up, perhaps quite naturally, at some of these criticisms, and also because we feel that this committee has been furnished, probably unintentionally, with a considerable amount of misinformation on these subjects."

He then proceeds to quote at such length from the writer's testimony before the committee on January 30, 1908, that there can be no doubt as to one, at least, of those he thinks responsible

for this misinformation. His first quotation is as follows:

I will take the Tennessee River. It is the largest and most important one, and it is a fair type of the rest of them. At Knoxville, Tenn., the head of navigation on the river, 650 miles above its mouth, I found a government fleet there—not one or two boats, but a fleet—engaged in dredging the channel and keeping it navigable. They dredge on a bar this summer, and they go back next summer and dredge the same bar. It fills up as fast as it is dredged out, and it is practically an unending work. They are receiving the effects of the erosion of the steep mountain slopes. They are helpless.

* * * * *

The natural fill becomes concentrated along the side of the island, and it is there that bars begin forming, and it is there that the United States Army engineers must step in and begin with their dams and locks and spend millions of dollars in improvement.

He proceeds to refute the statements as to the importance of sand and gravel bars in the river, and tries to make it appear that the great majority of the obstructions down to Chattanooga are hard rock ledges. In order to do this he quotes from an old report of an examination made by Lieut.-Col. S. H. Long, in 1830—eighty years ago. If Captain Johnston is at all familiar with the subject on which he was testifying as the official representative of his department, he would know that one of the essential features of the contention of the advocates of forestry is that, as a result of the clearing of forests on steep slopes and the consequent increased

more active within recent years, and that these changes have all occurred long since 1830. When his attention was called to this point by a member of the committee, Captain Johnston replied that he had no argument to make. Very naturally; there was none to make. An examination of this same upper section of the river was made by army engineers in 1893, and the report was published, and while this is sixty-three years later, even it does not describe present conditions as the annual reports of the army engineers in the last few years give them. If Captain Johnston is as familiar with the published reports of his office as it is fair to presume him to be, and as the committee was given to believe at the outset of his testimony, why did he dig up an old 1830 description of the river and try to have the committee take it as an accurate description of present-day conditions? Why did he not at least come down sixty-three years later and quote from the 1893 report? Or, better still, why did he not quote from very recent annual reports—for much change has occurred since 1893—if he desired to really enlighten the committee on present-day conditions there?

Let us, however, look somewhat closely at the testimony he does offer. He begins his quotation from the 1830 report with the following:

No. 2. Lyons Shoals. These shoals are created by an extensive rocky bar, etc.

It will be remembered that he is minimizing the gravel and loose material, and magnifying the solid rock ledges. If we are curious why he did not begin with No. 1, instead of No. 2, and turn to the 1830 report, printed in 1875 as House Exec. Doc., No. 167, Forty-third Congress, Second Session, we will read:

No. 1. Knoxville Shoals. * * * They are occasioned by a gravelly bar extending quite across the river. * * *

This was opposed to the view he desired to impress upon the committee, and so was very conveniently left out.

After quoting No. 2 as far as is given above, he adds: "I will not go on with the rest of that." If our curiosity is again aroused as to why he did not go on, and we read on, we find a second bar mentioned under that heading, and then the statement: "The obstructions on both [*i. e.*, bars] consist of rocks at the bottom, mostly loose. * * *". That is, the bars were mostly of loose boulders, but Captain Johnston quoted just far enough to leave the opposite impression that they were firm rock ledges.

Back in 1830, although there were some gravel bars on the upper river, they were doubtless stable, and remained so until within very recent years, when old ones began growing and new ones forming, as may be seen by reference to the recent annual reports of the army engineers. In 1830 most of the obstructions probably were rock ledges, and much of the money spent on the river in open channel work has been for building training walls and dams, but in recent years an ever-increasing proportion has been spent in dredging, and three dredging plants are now maintained on the river, one for each of its three sections. As to the magnitude of the gravel bars on the upper river, the 1893 report describes a number that vary in length from 2,500 to 7,000 feet each, and a number of gravel bars with occasional ledges of rock that run up to 15,000 or 20,000 feet each in length. Captain Johnston told nothing of these and did not quote from p. 1705 of the 1908 report that the dredge on the upper river had been doing such heavy digging that after only a few years' use it had to be entirely rebuilt.

As to the middle section of the river, he next quotes from the report of a survey of the Tennessee River from Scott Point to Lock A, made in 1901, that "there is little or no bar-making material traveling downward in the river bed," and "that there is little or no moving material in the bed of the stream." He failed to tell the committee that this same report, in direct conflict with the statements he did quote from it, shows that, in this distance of

159 miles, of the portions of less than five feet depth at mean low water, 81,850 feet, measured along the line of the channel, have a sand and gravel bottom, 77,800 feet are of gravel and rock and only 27,900 feet are rock. Nor did he say that in this section between Guntersville and Hobbs Island there are a number of gravel bars on which the 1903 report on p. 1595 says shoaling is occurring and from which over 200,000 cubic yards of gravel have been removed in recent years. Captain Johnston also fails to quote from p. 244t of the 1901 report concerning this same section in which the committee had been assured there was no loose, moving, bar making material, that "at the entrance to both divisions of the [Muscle Shoals] canal also a large amount of silt accumulates at every high water, and constant dredging therefore is required to keep the canal cleared." And all of this in a section that Captain Johnston would have the committee believe had no loose material in the bed of the river!

Captain Johnston told the committee nothing whatever of the lower section of the river, 226 miles in length, where, as in all normal rivers, because of its slight slope, more gravel and sand lodge than in the upper reaches. Had it not been so thoroughly out of harmony with the idea he was trying to impress on the committee, he might have quoted from pp. 1712-13 of the engineer report of 1908 that some of the bars there persistently reform and require dredging every year or two, or from p. 566 of the same report, that while in 1896 there were forty-nine shoals—all but two or three being of gravel—in this lower section, several more have since developed; that 1,127,660 cubic yards of sand and gravel had been removed at about thirty-one of these localities in the last few years; and that as to the results of dredging, the best they themselves can say is that results appear to be fairly permanent at about two-thirds of the places improved. None of this fitted into his picture of a river practically free from sand and gravel, and so was most conveniently omitted.

Captain Johnston continues quoting from the writer's testimony in 1908 as follows:

I have here a table, which I will not read, giving the streams in the south that are navigable, the length of navigation in each one, and the total expenditures of the United States government in 1790 to 1907, inclusive. On that Tennessee River over \$8,000,000 have been spent. Under present conditions, there is no chance to permanently improve that navigable channel, because of the incessant inrush of the sand and gravel. If the material is checked before it ever starts, up in the mountains, and kept there by keeping forests on those steep slopes that ought never to be cleared, then the necessity for this constant dredging would be greatly decreased, or perhaps obviated entirely. Merely as a business proposition, is it better to bale out sand forever from the stream and take no means for preventing it from getting in there, or is it better to go to the root of the trouble and hold the sand where it was made, on those steep mountain slopes, and keep it from ever getting down into navigable streams?

He then states that only \$1,700,000 of this total of \$8,000,000 has been spent in open river work, and contrasts it with—to quote in his own words—"Professor Glenn's inference of over \$8,000,000 having been wasted." At this point the chairman of the committee interrupted and added: "The statement was made here that it had cost \$8,000,000 to dig out of the Tennessee River the detritus that had washed down from the slopes." No such statement was made by the writer. His statement was that the *total expenditure* had been over \$8,000,000, and in the same testimony the distinct statement had been made and was included in the first quotation made by Captain Johnston, as given above, that army engineers had to step in and begin with their *dams and locks and spend millions in improvement*. This distinctly recognizes lock and dam work on the Tennessee as costing millions. If the river is kept free from sandbars, these millions spent on locks and dams may not be wasted, but if the bars are not kept dredged out, then these millions are wasted, for no matter how many locks and dams there are, a single sandbar across a river will render it useless for traffic just as surely as a

single wreck will block a railroad, or a single break deaden a telegraph line. The sand and gravel, like the stream, flow down forever.

The writer did not say that the army engineers were hopeless and had thrown up their hands in disgust, as Captain Johnston attributed to him in his testimony. He did say, and repeats, that while they may dredge out the sand, they are helpless to check or prevent its incessant inrush from the eroding mountains. Nor is this any criticism of the engineers. That the sand and gravel are constantly swept down to them from the headwaters is no more a reflection on them than to say that the water that brings it is being constantly carried down the same course to them. They are not hopeless or disgusted, but will dig and work as long as appropriations are forthcoming, and the history of their plans for improving the upper Tennessee River shows that their estimates to secure a three-foot channel at mean low water have steadily mounted for years, and that they are far from being ready to quit. In 1871 the estimate was \$175,000; in 1877, \$225,000; in 1884, \$300,000; in 1891, \$340,000; in 1894, \$650,000, in addition to the \$296,000 already spent; in 1907, \$1,080,000, in addition to the \$629,152.85 already spent, and in 1910 the writer understands that in a report on the upper river, recently submitted but not yet published, the plan of open channel work adopted years ago with the assurance that this upper section of the river was admirably suited to it, is now regarded as impracticable, and it is proposed to substitute in certain

parts of it locks and dams. The writer does not yet know what the estimates for this work now are, but lock and dam work is always costly, and it is safe to predict that, like the tariff, this last revision is like all of its predecessors, ever upward. They have not thrown up their hands, but constantly raise their estimates, instead.

It is probable that we at last have a plan of improvement that is adequate to meet present conditions, and that the increased estimate of cost is only what we may naturally expect to pay because of these conditions.

Captain Johnston is throughout his testimony, by his convenient omissions and garbled quotations, pleading a special cause, rather than presenting actual conditions fully and fairly. The many annual and special reports of the army engineers on the Tennessee River give too much information as to real conditions on it to make it necessary to draw on one's personal knowledge of the river to refute Captain Johnston's one-sided statements. It has, instead, been thought best to refute the army engineer testimony as cited Captain Johnston's out of the mouths of the army engineers themselves.

The writer would heartily agree with Captain Johnston, after finding it so necessary to correct and supplement his quotations, that the committee has been furnished "with a considerable amount of misinformation" on the subject, and he also agrees with the member of the committee who says, on page 158 of the report on the hearings of 1910, that "it is best for us to know the truth."



EDITORIAL

What Is Conservation?

IN VIEW of the prominent place that the issue which has been named conservation has occupied in the press of the country for some time, it seems unnecessary to ask the question at the heading of this article. It is, nevertheless, a fact that conservation is honestly misunderstood by many people, and that on the part of some others there is a persistent and reprehensible attempt to misrepresent its whole spirit and purpose. At frequent intervals there come, generally from the west, although the western complainants have eastern allies among the advocates of special privilege, sharp attacks on the advocates of conservation. These attacks take the form of newspaper editorials, of speeches addressed to public gatherings, of complaints by individuals who have found some of their privileges curtailed by the exercise of the functions of government in the public domain, or perhaps of handsomely printed circulars from banking houses setting forth the evils of the conservation policy and appealing to the patriotism of the people to permit the development of the country. Often they take the subtler and more dangerous form of undermining through political and official channels the great enterprises for real national development. The attempt is made to make it appear that the conservation of natural resources is a sentimental idea designed for the benefit of future generations by the sacrifice of the interests of the present. Our forests, our water powers, our minerals, are given to us, say these critics, not to bottle up and preserve for an indefinite future. They argue that the present generation is just as important as the next and those that will follow.

This is plausible. We have no doubt that many of those who advance these

arguments sincerely believe in the justice and patriotism of their position. Neither have we any doubt that many of those who use this argument use it deliberately to disguise plans for the personal exploitation of the property of the people.

The principle of conservation has been so often clearly stated that this misinterpretation by intelligent men is incomprehensible. Must it be repeated over and over again that conservation, in its special sense as now used among us to designate a definite national policy, means use, wise use, determined by the actual needs of the people; use without waste, and with perpetuation where that is possible, as in the case of forests; and use of the natural resources of the earth, the gifts of nature for the greatest good of the greatest number. Conservation has no idea of restricting use. It does exist for cutting out waste. It denies the primary right of a few individuals to use for their private and personal gain the resources of the people. That is simple and that is the reason for all this misrepresentation. The galled jade winces.

It is characteristic of the exploiters to represent themselves true benefactors, the real friends of the people. Personal exploitation of the public property always shelters itself behind the guise of "promoting the public good," "the development of the country," "adding to the country's wealth," and many people believe the claim. We all believed it a few years ago until we began to study the forestry question, which has taught us many things about our national domain.

Mr. Garfield stated the issue clearly, when he said in reply to a question while he was on the stand in the Pinchot-Ballinger inquiry, "We believe in present day use of the resources so

far as they are needed, but we do not believe in unregulated and unrestricted monopoly." That we understand to be the whole question in a nutshell.

Let us look at some concrete examples. In the west were millions of acres of virgin forest, growing where, for the most part, only forests would grow. A few lumbermen might take these lands up and under some of the acts which were passed to encourage the pioneer, cut and market the timber as fast as practicable, accumulate swollen fortunes, and leave the land bare and non-productive and the water courses unprotected. This would deprive the present generation of much of its working material and it would entail upon those who come after us great deprivation. Millions would have lost their share in the national birthright that a few might secure abundant profits. This is what was happening when we began to reserve national forest land and otherwise to safeguard our western possessions. And when certain western statesmen wax eloquent over the wrongs of the poor western settler, it is worth inquiring whether there is not behind the poor western settler a principal who is anything but poor and who is angered at seeing his opportunity for looting the rich public domain taken away. This is not theory or inference. It has been abundantly proved, even as to some of the "men higher up."

Again, the United States, not a syndicate of its citizens, bought Alaska, taking the risk of what seemed to almost every one except William H. Seward a decidedly speculative investment. Up there we, the people of the United States, own vast beds of excellent coal which we have been informed on good authority can be got out for about \$2 a ton. Government vessels on the Pacific coast, within easy reach of the Alaska supply, use tens of thousands of tons yearly, and pay a large price for it. Why should we turn over these Alaska coal fields for a song to the Guggenheims or any other combination in order that they may turn around and sell to us, the United States,

for \$12 a ton, coal that cost them \$2 a ton to mine and an insignificant sum to own? That is not development of the national property. That is swindling the nation out of its own.

This is a simple business question for the people of the United States, and it is the simple business aspect of some of these questions that we who demand proper conservation of natural resources are asking consideration for. These questions are just as important to the present generation as to the next. If we entail our national property, we are just so much the poorer, even if a few fortunate gentlemen are a few millions richer. Profits made by individuals through this kind of manipulation are not legitimate, for they are unearned and are taken from the real owners. The legitimate interest of individuals may be easily provided for without throwing away the people's birthright for a mess of pottage.

This is not socialism. It is hard-headed, everyday business fact, and it is a part of the policy of conservation.

The individual complaints of genuine settlers on the public land who wish to secure cultivable lands which are included within national forest areas, are no proper part of this misrepresentation and attack on conservation. They are merely incidents in the development of the national property, although they are used by the assailants of conservation to make arguments in opposition to it. These cases, which are sometimes hardships for deserving individuals, can be and will be adjusted in due course of time. It is unfortunate that the public business cannot be transacted more simply and directly and more effectively, and that such cases cannot be promptly and equitably disposed of; but we have not yet succeeded in freeing the government machinery of its entanglement of red tape. This, however, is no argument against conservation, which is a vital principle of the nation's life. Conservation will not withhold from settlement and development by genuine settlers any cultivable land. On the contrary, the development of the agriculture of the country

to its fullest extent, the maintenance of soil fertility and its improvement wherever possible, are essential parts of the conservation doctrine.

Conservation is not a national policy only. A Michigan paper recently made the remark: "There is not a state, a county, nor a city that isn't saving at the 'spigot and wasting at the bung-hole.' The old idea that any man may do as he pleases with what he calls his own needs revision. Every man's rights are limited and restricted by the rights of all others." Here is the fundamental principle of the whole conservation movement, and it is something that we must learn. It is irrelevant to make pathetic appeals in behalf of the pioneer. He should have a square deal in every respect, but the American pioneer has always shown himself capable of taking care of his own interests. The question of society to-day is a complex and difficult one and we must take into consideration the interests of the millions of people for whom these natural resources must be used if they are to continue to live on this earth in peace, happiness, and prosperity.



The Reply of Professor Glenn

AT THE hearing on the Weeks bill before the committee on agriculture this year one of the most important testimonies that has ever been given in behalf of the maintenance of the Southern Appalachian forests for the protection of streamflow was that presented by Prof. L. C. Glenn of Vanderbilt University. Mr. Glenn testified from the standpoint of a geologist, and of one who had wide experience and who had made special field studies in the Southern Appalachians. At the same hearing, by invitation of the committee, certain officers of the army engineer corps appeared. Some of their testimony contained admissions very helpful to the cause of the proponents of the bill. Some of it was along lines less favorable, such as have been made familiar through the published arguments of Lieutenant Colonel Chittenden,

of the same corps. Some of them were irrelevant, because they related to conditions far removed from the Appalachian area and very dissimilar to the mountain conditions. The last of these officers to testify was Capt. Edward N. Johnston. Captain Johnston was placed in a very difficult position. He was frankly put forward to defend his corps, by citations from their own documents and reports, against assumed criticisms of their river work.

It seems to us that this voluntarily defensive attitude showed an undue sensitiveness. The claims of the advocates of forest preservation that such preservation would go a long way to protect the streams from the sedimentation which the engineer corps is constantly called upon to fight, does not imply a criticism of the corps for the excellent work that it has done in its own way. The corps is not a forest service, and its great mistake has been in assuming certain things in regard to the effect of forests which are not in accord with the experience of a large body of civilian engineers and foresters, here and abroad, who have studied the question with more thoroughness than any of our army engineers has ever claimed for himself. However, this was the purpose for which Captain Johnston appeared, and he disclaimed, with engaging candor, any desire to attack the proposition before the committee, or to be drawn into any discussion of it. This is where the difficulty and delicacy of his position developed. The question before the committee had become an eminently controversial one, and it was next to impossible for any one to appear while that was under discussion before the committee without being drawn more or less into the controversy.

Thus it happened that Captain Johnston's testimony was not simply a documentary defense of the engineer corps, but an attack upon the testimony of some of the witnesses who had appeared in behalf of the Weeks bill, and particularly of Professor Glenn. We felt while the hearing was in progress that this criticism of Professor Glenn in his absence involved a measure of

unfairness, as it challenged directly the accuracy of his statements. We also felt that Captain Johnston's testimony unintentionally, as we fully believe, was not complete, and to the extent of its incompleteness did not fairly represent the case. We even think that he did not fairly represent his own corps, for the reports of the engineer officers are always fair, very often full and enlightening, and they contained much information which Captain Johnston, either through lack of time or for some other reason, did not give in his citations to the committee.

We have, therefore, invited Professor Glenn, after a perusal of the testimony as preserved in the minutes of the hearing, to make such reply as he chose to Captain Johnston, both on his own behalf as a witness, and on behalf of the cause that he represented, so far as it was involved in the points of the testimony. This reply is published in the present number of AMERICAN FORESTRY. We believe that our readers will find it an interesting and important addition to the discussion to which we have already given much space, but no more than its importance deserves. Professor Glenn's reply is a compact citation of facts and figures bearing directly upon the points at issue. It is not published in any spirit of hostility or of criticism of the engineer corps, for which we have the greatest respect and admiration, or of the able and courteous officer who spoke for the corps, and to whom it is a reply. We believe, however, that the questions involved are of too much importance to be settled upon the basis of the prejudices or *esprit du corps* of any body, but that all the interests concerned will be best served by a fair and full discussion and a knowledge of all the facts.

The Proposed Morton Memorial

THERE has been introduced in the Senate and referred to the committee on agriculture and forestry, a bill to promote the science and practice of forestry by the establishment of the Morton Institution of Agriculture

and Forestry as a memorial to the late J. Sterling Morton, former Secretary of Agriculture. This bill, as its first section sets forth, is for the purpose of aiding in the advancement of the science and practice of forestry, including tree planting and tree culture among the people of the several states, by furnishing to students and teachers of said subjects adequate facilities for study and scientific research, as well as for experimental tree culture. A prominent feature of the plan is a museum for the reception of specimens, models, and other illustrative material. The bill also provides that the institution shall be located at or near the former home of Mr. Morton, in Nebraska City, Nebr.

The institution is to be under the control of the Secretary of Agriculture, who is to secure the site and erect the buildings, at a cost of not exceeding \$250,000, these buildings to be of sufficient size for the carrying on of the work of such institution and for the reception and arrangement of specimens, pictures, maps, charts, instruments, and models, showing the uses of wood and all products of the forest, together with suitable rooms for a laboratory, lecture room, chemical appliances and equipment.

The institution is to be in charge of a director whose salary will be \$6,000 annually, and other teachers, lecturers, instructors, and assistants are to be appointed by the Secretary of Agriculture as the needs of the institution require. It is further provided that the specimens, maps, pictures, charts, instruments, models, literature, chemical and laboratory equipment now in the custody of the Department of Agriculture, which the Secretary shall see fit to place in the new institution, shall be delivered to the director thereof. The institution is to be open at all times, free of tuition, to teachers and students of state agricultural colleges and to persons in the service of the government of the United States, and all others interested in the study of forestry for study and research under proper regulations.

This is an interesting project, and has much to commend it, but the measure as introduced has grave defects and should not be passed without material amendment.

In the first place, the location at Nebraska City is a decided objection to the bill. This is not a desirable location for a great, national institution for the benefit of the whole country. It is proposed to put this institution in charge of a director whose salary is larger than that of the forester of the United States, and such an institution so officered and containing the most valuable material which has been accumulated by the Forest Service and the Department of Agriculture, should either be at the nation's capital or at some center where it will be easily accessible. This is not true of the location proposed by the bill. The only reason that can be adduced in favor of the Nebraska location is the purely sentimental one, that it was the home of Mr. Morton, and this should not in the least control action in the location of so important a national institution, which would have a practical work to do. The honor to Mr. Morton in establishing and naming for him this institution would be sufficient. It is not necessary that it be established in his home town. It is desirable that the salary of the director of such an institution should be sufficient to command the highest grade of scientific attainment, but that the director of this proposed forest school should have a salary greater than that of the forester of the United States, under whom is the administration of all our great forest domain and the working out of the many problems connected with the development of forestry in the United States, would be unreasonable and unjust in the highest degree. The position of the latter official requires the highest grade of administrative ability as well as scientific attainments equal to those required by the director of the proposed institution.

The proposed removal to the new institution would practically remove from the capital the headquarters of the

United States Forest Service, because its offices would naturally have to follow its material. This goes back to the first objection made. Of course, if the proposed institution were located in Washington, as it certainly should be, the objection would not hold.

If the bill should be amended to remedy these defects, to establish the institution in Washington, to make it the headquarters and scientific center of the Forest Service, and to place its director in proper relation to the forester, we believe it would be productive of great good and we should give it cordial approval.

The East and Irrigation

A RECENT letter referring to the hostility of the east to irrigation projects and to the arm-chair critics of the eastern section of the country who fear that the reclaiming of the western lands will introduce dangerous competition with eastern farming communities, calls for a suggestion that it is a mistake to suppose that there is any general hostility in the east to the reclamation of the arid lands of the west. Such opposition as there is has been largely stimulated by the western enemies of national irrigation, who, though few in number, have sometimes been abnormally active. It may be remembered by those who participated in the movement to secure irrigation legislation, that the support of the east, through its newspapers, through the good will of its people, and finally through the very necessary votes of its representatives, was freely accorded, and the east as a whole has always supported the reclamation work, believing that the development of the west was a development of the United States. We have frequently had occasion to note a lack of reciprocity of this sentiment on the part of the west. Looking at the subject from a national point of view, as AMERICAN FORESTRY does, we can only suggest that the very best thing for the people of both sections is to become acquainted with each other

and with the different parts of our great country, to know their mutual needs, and to drop sectional jealousy and rivalry and consider national development from a national standpoint. The only competition should be a competition to see which section will do most by its own energy and ability for the common advancement. There is need enough for all the land in the United States to support the people who will be living here within the coming century. Widespread intensive cultivation of all lands that can be made available for that purpose, and the growing of forests, for wood supply and protection of springs and streams, on all non-agricultural lands are the means by which alone the future welfare of the country can be maintained.

Our Spendthrift Reputation

THE *Montreal Star* throws a sidelight upon Canadian relations with the United States in an article on reciprocity and conservation. Referring to negotiations said to be progressing favorably between the dominion government and Belgium and Italy for trade agreements, the *Star* says frankly that the advantages of trade with the United States are obvious because of the proximity of the two countries, their mutual trade needs, and the nearness of markets. It concedes that immediate gain to Canada is likely to be greater from trade with the United States, but it turns from this aspect of the case to consider the advantages of trade with Belgium and Italy, which it regards as none the less important for being less obvious. It notes the fact that "immediate trade gain and the welfare of the Dominion may be two very different things." And here is the interesting point of the argument to us on the south of the Canada line:

One of the outstanding needs of Canada is capital for the development of her resources. We are likely to obtain that capital from countries with whom we do a large trade. The capitalist will bring with him the method of development to which he is accustomed in his own land. The American

capitalist has wasted his own resources and he is not likely to conserve ours. The European capitalist—the capitalist of Belgium, of Italy, and in a high degree of Germany—has learned well the lesson of conservation. If we can secure the development of our resources by European capitalists, we will be likely to get a development which will guard the interests of future generations and enrich instead of impoverishing the country. If we give the American free scope, he is likely to land us where he has already landed his own nation. These are strong and far-reaching reasons why we will do well to encourage the European trader to come among us and bring in his wake the European capitalist.

Does this argument seem overdrawn?

It must be remembered that Canada views questions sometimes in a large way and looks deeply into things for causes and effects. It has often happened that her policy has been directed by visions of imperial development, and we know that on the subject of conservation, while Canada may not be talking as much as the United States, she is taking positive action in many directions, notably in that of forest protection.

The viewpoint of the *Star* is especially significant in its exposition of the fact that we are looked upon from outside as an extravagantly wasteful people whose methods cannot be trusted. Of course, we are disposed to reply with a loud and patriotic flourish, accompanied by the eagle and the flag. But perhaps it will be more profitable to sit down quietly and consider the reasons for our neighbor's opinion of us and its probable effect upon our standing as a nation.

Protection from the Canadian Side

IN THE last number of the *Canada Lumberman*, James Innes of Chat-ham, a prominent cooperage manufacturer of the dominion, makes an argument for the protection of the cooperage industry in Canada on the ground that it is in bad condition and cannot recover without the assistance of the government. Curiously enough, this familiar argument is directed against cheap labor in the United States. The

Lumberman, in its editorial comment on the article of Mr. Innes, refers to the fact that foreign staves made from southern pine by negro labor can be sold in Ontario, which they enter free of duty, at prices which prohibit the manufacture of staves in Canada. This condition was brought about by the decision of the customs department that staves were lumber and entitled to free entry into Canada.

Further discussing conditions in this country, our contemporary says that the negro laborers live on wages which would not enable the Canadian to feed himself decently. How much this reminds us of the argument in regard to protection of our products against the pauper labor of Europe.

The *Canada Lumberman* has another article discussing reciprocal trade relations with the United States and expressing the opinion that there will be much less interest than heretofore among Canadians in reciprocity with the United States. The recent approach of the United States in this matter is treated as being of very little interest to Canada. The *Lumberman* remarks that Canada has been selling her goods in foreign markets against the competition of every nation and has been selling them to Englishmen in many parts of the world. The emphatic statement is made that Canada does not need reciprocity to-day, that she needs instead caution against too easy access to her home markets for the products of the United States. "There is no feeling of prejudice," says the *Lumberman*, "against the people of the United States in Canada, but there is a well founded belief that United States goods are produced in too many instances under economic conditions which are not satisfactory to Canadian ideals, and that, therefore, unless similar ideals are to be introduced into Canada, these goods must be prevented from flooding our markets."

Having said this upon the general question of reciprocity, the *Lumberman* goes on to take up the question in its relation to the conservation of the natural resources of Canada, presenting the view which we have already cited in *AMERICAN FORESTRY* that the protection of Canada and her interests in her natural resources, and especially in her forests, requires great caution in dealing with the United States. It says that it is a question even to-day whether Canada would not be better off if it sold less lumber in this country and made more certain of a continuous supply for its own needs. The closing paragraphs of the article are extremely interesting, and we quote them in full:

In the United States the political situation is marching rapidly toward something which looks like a tariff revolution. The west is feeling the size of its muscles and is training seriously for a tussle with the east on the question of protection. The east is attempting to improve its position by various methods, not the least interesting being the proposed reciprocity negotiations with Canada, bearing promise of some tariff rearrangements which will be acceptable to the whole country, and appear in the light of a fulfilment of recent anti-election pledges of cheaper goods for the consumers of the important necessities of life.

If Canadians understand their own welfare now as thoroughly as they have in the past, the hopes of the Republicans in the United States will not be greatly gratified by reciprocal trade arrangements. Canadian sentiment is growing rapidly against it, and in regard to lumber, which will be one of the storm centers of discussion, there seems to be no question that Canadians already look upon freer access to United States markets as something of a gold brick. The immediate future, therefore, is full of interest and importance to the people of both countries and events are sure to be followed by Canadians with a watchful eye.

In discussions of questions of the forests and their protection, we generally look at our own side of the case. It is interesting, sometimes, to have the light turned upon the "other fellow's" point of view, and for this reason we cite the article which we have reviewed.



NATIONAL FOREST WORK

Boundary Changes in National Forests

The work of revising the boundaries of the national forests continues: The President has signed a proclamation eliminating 94,290 acres from the Las Animas National Forest and 5,675 acres from the San Isabel National Forest, Colorado. The proclamation also provides that the two forests shall be consolidated and known as the San Isabel National Forest. The entire area will be administered by the supervisor stationed at Westcliffe, and the supervisor's office at La Veta will be discontinued, the Las Animas division being administered by a ranger under the direction of the Westcliffe office.

Much of the land eliminated has already passed into private ownership. The rest is for the most part open parks and scrub oak land chiefly valuable for grazing, though a comparatively small portion is suitable for agriculture. The small proportion of the eliminated area that has a forest growth has been cut over and in addition extensive burns have occurred. These burns are restocking with yellow pine, but it is very scattering, and the percentage of public land is so small that further administration as a part of the national forest is considered impracticable.

The eliminations from the San Isabel forest consist of numerous small areas scattered along the exterior boundary. The area released from the Las Animas comprises a strip of land for the most part from three to six miles in width along the northeast, east, and southeast boundaries.

The eliminations are the outcome of detailed field examinations made by the Forest Service during the summer of 1909 under the direction of the Secretary of Agriculture. The unappropriated areas will be restored to settlement and entry after having been advertised in the local papers by the Secretary of the Interior.

The President has also signed a proclamation eliminating 203,635 acres from the Wallowa National Forest, Oregon. The elimination is the result of a careful examination during the past summer, which disclosed the fact that the areas now eliminated were either open grass land with very little timber or timbered areas so largely alienated that further administration by the Forest Service was considered impracticable. The lands released are not needed for watershed protec-

tion, and are not considered to be chiefly valuable for national forest purposes.

Some sections are transferred from the Wallowa to the Wenaha Forest, the area having been isolated from the Wallowa by the large eliminations. The unappropriated portions of the areas eliminated by this proclamation will be restored to settlement and entry after having been advertised in the local papers by the Secretary of the Interior.

A third presidential proclamation adds to the Datil National Forest, in New Mexico, 183,091 acres, and eliminates 95,178 acres. These changes are also the result of the recent field examination. Three areas are added to the eastern division of the forest, and one to the western. The largest addition to the eastern division brings within the forest the Bear Mountains and surrounding country, lying east of the old boundary. On the north, a strip containing eighteen sections of the southern watershed of Alamosita Creek is added. The new boundary practically coincides with the foot of a line of bluffs along the creek, and is therefore advantageous from an administrative standpoint. The third addition to the eastern division is five sections of land at its southwestern corner, west of Crosby Mountain.

The addition to the western division takes in the Luera Mountains on the east. The only large elimination is from the southern end of the Magdalena division. Smaller eliminations and additions alter the boundaries of all the divisions at various points.

The additions contain good growths of merchantable saw timber, totaling about 30,000,000 board feet, besides a large amount of cordwood. The soil and topography make forest protection necessary in many parts. It appears that overgrazing of the lands now added has seriously hampered the growth of reproduction. The greater part of the Datil National Forest is rough and mountainous, but is particularly adapted to grazing. There are many deep, narrow canyons, with large mesas between them sloping off toward the river courses. The water is important for irrigation on the level country beyond the forest limits. The eliminations consist almost wholly of open grazing lands, where no watershed protection is necessary. There is also eliminated the little mining camp of Fluorine, located on the south half of Section 34. The lands eliminated from this forest will also be promptly restored to settlement and entry in the usual manner.

The President has also signed proclamations eliminating from the Gunnison National Forest, Colorado, 11,195 acres; from the Cochetopa Forest 5,640 acres, and from the Uncompahgre Forest 45,489 acres.

The lands excluded from the Gunnison comprise several strips from one-half mile to one mile in width, located along the exterior boundaries of the western portion of the forest and embracing particularly lands which have agricultural possibilities. The most extensive and important of the changes affects lands lying along the western boundary south of the north fork of the Gunnison River, and along Minnesota and Reynolds creeks. Also a few sections have been eliminated along Smith's Fork and Crystal Creek.

The lands excluded from the Cochetopa are rolling foothills and level flats along the exterior boundaries of the southeastern portion of the forest in three different places.

The lands excluded from the Uncompahgre are located in the southeastern corner of the old Uncompahgre Forest, in San Miguel County. The territory contains no merchantable timber of value, and is not considered of importance from the standpoint of forest conservation. Of this area, 23,560 acres has already been alienated through homestead and other entries.

The Fire Protection Work with the Railways

In the Northwest arrangements have been made to put in operation the cooperative agreement between the men of the department of forestry and the officials of the railroad companies which traverse the national forests. The forest engineers are making detailed maps, showing all the vantage points and the zones of greatest danger along the railroad lines. Clause 1 of the agreement re-

quires that the railroads clean up effectively all the rubbish, debris, and inflammable material in the zones of greatest danger, and it is necessary for the forest service to designate these zones on maps. The maps have spaces for the railroad companies to insert the names of the men to take charge of this work. The location of the caches of tools are marked on the map and the telephone stations are made in colored spots. This work will be very valuable in helping the parties to the agreement to get together quickly in case fire is discovered along the railroad territory. The zones of greatest danger from fire will be patrolled by men on "speeders," while other districts will be patrolled by men on foot. The forestry department's map will be completed in a few days and then turned over to the railroad companies to fill in their part of the work.

District No. 1

Recently W. B. Greeley, district forester of district No. 1, has been upon the north edge of the Flathead national forest examining two large areas of timber that the government has decided to sell on account of the timber being thoroughly mature. Some of it measures from three to four feet in diameter. When this large timber is removed, it is planned to replant the district cleared.

It is reported that the examination also showed some tracts adapted for agricultural purposes, and as soon as the timber, which is very dense, is cut, the land will be open for homestead entry subject to the existing laws of the government. These lands to be opened for agricultural purposes are situated at the bottom and along the high watershed on the north side of the reserve.

THE WEEKS BILL

The bill for the acquisition of national forests which has become popularly known as the Weeks Bill, passed the House of Representatives at midnight on Friday, the 24th of June, by a vote of 130 to 111. It was fought at every stage by its opponents in the House, and an attempt was made to prevent its passage by dilatory tactics, when it finally came before the House. Its passage was a triumph for the management and hard work of the men in whose hands it has been.

In the Senate the bill came up on Thursday, and an open filibuster was immediately

begun by Senator Burton of Ohio and Senator Newlands of Nevada, assisted, to some extent, by certain other senators. Owing to the determination of the Senate to adjourn on Saturday, the filibuster was successful in preventing the passage of the bill at that time, but an agreement was reached by which a vote will be taken on the bill on the 15th of February, 1911.

In the August number of AMERICAN FORESTRY we shall give a fuller account of the proceedings, and an analysis of the vote on the bill in the House.

STATE WORK

The Louisiana Forest Law

Unless unexpected delays occur, by the time this issue of the *Journal* reaches its readers, Louisiana will have placed itself upon record as having enacted into law the first up-to-date forestry bill to be passed in any of the southern states. The bill would have been introduced several weeks ago, had not some of the larger lumber interests of the state asked for additional time to examine it.

The bill as it seems certain to pass is essentially a fire protection measure. The tax imposed for fire protection will be three-quarters of a cent per 1,000 feet on pine, and the same amount on hardwoods. The constitutionality of this tax on lumber has been questioned, and may ultimately be tested in the courts.

The sentiment of the lumbermen seems to be that, inasmuch as the passage of such a bill is demanded at this time, the provisions of the bill, as introduced by Representative Henry Hardtner, representing the Conservation Commission, are as mild as can be expected, and most of the lumbermen seem inclined to accept this bill in lieu of other and more radical measures which might be forced through.—*Lumber Trade Journal*.

Forestry for Profit

M. W. Wentworth, steward of the sanitarium at Battle Creek, has embarked in an extensive experiment in forestry, according to *Michigan Roads and Forests*. He has bought the sanitarium farm of 200 acres at the south end of Lake Gogouac, formerly known as the Gregory homestead, and will plant 10,000 trees. The varieties that will be planted are the black locust, the catalpa, and the spruce.

The spruce will be grown for Christmas trees and the locust for fence posts and railroad ties. The catalpa and locust will be grown on the marsh land, of which there is quite an extensive area adjacent to the lake. This will utilize land that has hitherto been useless for cultivation. Mr. Wentworth is the second person in that section of Michigan to make the experiment.

The first person to make an experiment in this line was Clayton Strait, of the township of Emmett, Calhoun county, who three years ago set out 300 sweet chestnut trees on a piece of land on the shores of Beadle Lake. The trees were obtained from the Michigan Agricultural College and at that time were

only a few inches in height. They have nearly all lived and are now from five to six feet in height. So far Mr. Strait's experiment has been a success.

The experiment of Mr. Wentworth will be watched with much interest, as it is on a much larger scale than Mr. Strait's. If the black locust and catalpa will grow in marsh land there are thousands of acres in Michigan that can be devoted to tree growing.

New Hampshire

Two nurseries, intended largely for the production of white pine seedlings, have recently been started in the state. The members of the New Hampshire Forestry Commission, not having succeeded in obtaining state legislation to establish a nursery, have undertaken to start one themselves as an object lesson, and this has been established in Pembroke. It is the hope of the promoters of this enterprise that at no distant day the state will maintain a nursery from which New Hampshire land owners can obtain stock at cost price for reforesting the lands of the state. The forestry commissioners conceived the idea of establishing this nursery because, for a number of years past, they have received annually a great many inquiries from residents of the state as to the best method of procuring seedlings and the nearest place from which they could be obtained. It was felt that those who made these requests should not have to be sent outside the state, and after a tour of the state to determine the most desirable site, arrangements were made for establishing the nursery on the farm in Pembroke. Already about 80,000 seedlings had been successfully raised on the farm, and these were taken over as a nucleus for the new work. The members of the commission personally meet the expenses of the enterprise. There is no intention of making this a commercially profitable enterprise. The object is to furnish seedling trees to residents of New Hampshire at the actual cost of production. The nursery contains at present between sixty and sixty-five thousand trees, and it is the plan to largely increase its production.

In the town of Hinsdale, the Keene Forestry Association has about fifteen acres under cultivation and is growing 400,000 yearling pine trees, while about 170,000 trees two years old were sold this year. There are also several acres of trees of this year's seeding

which are just coming up, the length of the seed-bed, figuring each row, aggregating no less than three miles.

Private Forestry in Pennsylvania

On lands owned by him near Reading, Pa., Jacob Nolde carries on forestry operations, employing a professional forester. Under his direction, says the *Reading Telegram*, there have already been planted hundreds of thousands of trees, and important investigations are being carried on as to trees best adapted to this locality, as well as to the diseases to which the trees as most subject. It is impossible to expect that Mr. Nolde's example will be extensively followed at once, but he is pointing the way by which the wealth of the country may be greatly added to during the coming generation, and when the people wake up to the great possibilities of the reforestation, on scientific lines, of the great acreage of waste lands that lie within the borders of the county, it will only be necessary to follow in the path which he has marked out. The extent of Mr. Nolde's operations may be judged by the fact that his plantings, this spring, ran to the number of some 150,000 trees.

Washington

A commission of twelve men has been appointed by Governor Hay to devise a comprehensive scheme of forest legislation. The commission is to study the logged-off lands problem, forest fire protection, reforestation of lands unfitted for agricultural purposes, and similar matters, embodying their investigations into a report, which will be transmitted by the government to the next legislature.

The members of the commission are: A. G. Avery, lawyer, Spokane; J. J. Brown, president Washington Conservation League, Spokane; George S. Long, president Washington Forest Fire Association, Tacoma; E. G. Ames, vice-president, Port Gamble, and D. P. Simons, Jr., chief fire warden, Washington Forest Fire Association; J. J. Donovan, Bellingham, president Washington Logged-off Lands Association; Prof. F. K. Benson, University of Washington; George E. Boes, Seattle; Prof. F. G. Miller, dean of the forestry school, University of Washington; R. W. Douglas, elective secretary Washington Conservation Association; Frank H. Lamb, Hoquiam, secretary Western Forestry and Conservation Association, and Prof. R. W. Thatcher, dean of the agricultural school of the state college at Pullman. All are members of the Washington Conservation Association.

EDUCATION

University of Wisconsin

In considering its educational opportunities and responsibilities in connection with the new forest products laboratory, the University of Wisconsin, recognizing the thoroughness with which the neighboring universities of Michigan and Minnesota occupy the field of forestry instruction, decided that it could do the best service for education by providing practical courses along special lines, such as the laboratory would offer special facilities for. The announcement of these courses, as planned for the coming year, is now made. They are described as courses of instruction in wood technology and the mechanical engineering of woodworking plants.

The three phases of the problem of saving timbers and using all the present waste from the lumbering and wood manufacturing industries will be considered in the new lectures and laboratory practice by the students, including special study of the physical and chemical properties of wood; of preserv-

ing and utilizing not only the timbers, but the stumps, small branches, bark, sawdust, and all the waste bits; and of the mechanical means of transforming standing timbers into commercial products.

Four courses in wood distillation, wood preservation, the chemical constituents, and the physical properties of wood will be given by the staff of government experts in charge of the laboratory. A fifth course in wood manufacturing machinery will be given by Prof. Robert McKeown, of the engineering college.

In the course on the properties of wood, the study will be mainly of the elementary structure of different species and its effect on the value of woods for use in various arts and industries. Methods of testing woods and conditioning them will also be shown in the laboratory demonstrations. The course will be given during the first half of the first semester.

The chemical constituents and fibers of wood, with reference to the uses made of the

material in art and industry, will form the subject-matter of the course to be given the second half of the first semester.

Hardwood and softwood will be studied and compared as to their use in distilling alcohol and producing turpentine and other materials in a course to be given in the first half of the second semester. All of the basic principles, as well as the processes and products of such distillation will be taught, and the students will have an opportunity to make a personal study of the government's investigations in ways and means of using all the waste products of logging, lumbering, and wood manufacturing, amounting altogether to two-thirds of every tree cut down.

How to save timbers, especially those in mines and on the water front, from animal and fungous pests, will be the problem on which a course in wood preservatives will work. The students will compare the resistance of different woods, their fibers and the conditions of deterioration, and will be shown the different preservative processes in the laboratory, including both those in which the timbers are given surface applications and those in which the aseptics are forced into the fibers.

All the machinery and methods used in logging and in wood manufacture with the designing of woodworking plants, will be taught by Professor McKeown during the second semester in his course on wood manufacturing machinery.

In addition, advanced research work may be done by students who are prepared for it in the government laboratory under the supervision of the experts in charge.

Michigan Agricultural College

The summer forestry school opened on the 28th of June and closes on the 11th of August. The session is held at Cold Springs, on the shores of Higgins Lake, and is conducted in cooperation with the Public Domain Commission. The state forest reserve of 38,000 acres, timbered with jack pine, Norway pine, white pine, scrub oak, and white cedar, is located here, and it is upon this that the students will work.

This summer term is required work for junior foresters. Two courses will be given, one in surveying methods and one in forest mensuration. These courses are not complete in themselves, but are followed by advanced work during the remaining terms of the junior and senior years. Each course entitles the student to five college credits. The program provides for one lecture hour and eight hours of field work each day. An hour will be given to target practice, swimming, and boating. The mail address is Roscommon, care of M. A. C. Forestry Camp.



Washington State Agricultural College

C. H. Goetz, who has been for two years teacher of forestry at this institution, has resigned his position. During the summer he will be in the employ of the Washington State Fire Association in its work of protecting the forests of Washington against fire. Ten or more men have gone out of this institution since Mr. Goetz took charge of its forestry work and are now in the United States and other forestry work.



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Reports and Bulletins from Massachusetts

Five substantial pamphlets of considerable local importance and of value to students of forestry all over the United States have come from the office of the state forester of Massachusetts. The first of these is the Annual Report for 1909. This report shows a great expansion in the scope and organization of the department, owing to the placing upon it of the task of the gipsy and brown-tail moth control, which until a year ago was in the hands of separate officials. The staff now includes, beside the state forester, Mr. Rane, four assistants, a secretary, three clerks and fifteen agents and division superintendents. Besides these, there is a forest warden in every town of the state, whose appointment is primarily by the town or city officers, subject to the approval of the state forester, under whom the forest warden's work is done. The expenditures for 1909 were \$10,000 for the general forestry work, \$9,842.87 for reforestation work, and a little less than \$300,000 for the moth suppression work.

A bulletin on "Reforestation in Massachusetts," by R. S. Langdell, assistant forester, is of much interest in view of the modest but persistent work which the state has undertaken in the way of reforestation. This work is being carried on under a systematic plan, authorized by law and supported by a continuing annual appropriation of \$10,000. The bulletin referred to describes the methods of work pursued, shows by illustrations the character of it, and discusses the trees most favorable for such work in the state. From the forester's report for 1909 we learn that nine hundred and twenty-seven acres were planted by the state in that year, these being in tracts from five to 107 acres. And 111,509 trees have been planted by several water

companies and private individuals under the advice of the state forester.

The third bulletin is entitled "How to Make Improvement Thinnings in Massachusetts Woodlands." An earlier bulletin on "Forest Thinning" was published by the state service, but this is much more comprehensive in its discussion of the subject, and uses some of the material of the earlier publication. The author is H. O. Cook, assistant in charge of that part of the state forest work.

W. F. Fiske, agent and expert of the Bureau of Entomology, United States Department of Agriculture, who has been in charge of the work of developing parasites of the gipsy and brown-tailed moths in Massachusetts, is the author of another bulletin published by the state service on that subject. It is an extremely interesting publication, especially for all those who are within the danger zone of these destructive moths. Mr. Fiske is an industrious and careful worker, and has obtained a very good mastery of his subject. He treats the nature of insect parasites, the natural control of the moths, the theory and practice of introducing parasites, the sequence of parasites, and the different parasites in detail. The bulletin is quite fully illustrated, and is full of practical entomological information.

The last on this list of state publications is the report on "Massachusetts Wood Using Industries," by Hu Maxwell, the expert of the United States Forest Service, under a cooperative arrangement between the United States and the state services. It is the first of a series of these reports to appear in printed form. This report gives the amount of different varieties of woods used in the industries of the state, the cost at the factory, and the amount grown in the state. It also gives an analysis of the wood used by each class of industries and the average cost to them of their raw material. It is interesting to notice that the manufacture of boxes and crates heads the list, using sixty-four per cent of the lumber that is consumed in the state. There is, finally, a list of the wood manufacturers from whom the information was obtained and a table showing the uses by species of different woods. These reports, which are a part of the work of the office of wood utilization of the branch of the products of the Forest Service, will be of great practical value in determining the exact status of the lumber business in the country. Reports from several other states are now in preparation.

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A Tree Manual for Kentucky

The Kentucky Federation of Women's Clubs did good service when it planned and carried out the publication of the "Native Trees of Kentucky." This handbook by Mrs. Maury, the chairman of the forestry committee of the state federation, is

an excellently done piece of work and is a complete tree manual for the state. The illustrations are good and as the work has been guided and approved by eminent authorities, it is safe to assume its accuracy. It is well printed and the illustrations really illustrate. At the end of the book is a list of 112 trees, native to Kentucky, a list of eight trees that are in doubt, and of ten, the occurrence of which in Kentucky is in doubt. Besides these, there is a list of foreign trees that have become spontaneous in Kentucky. The preparation of such a book as this in all our states would be of great educational value and would doubtless stimulate tree study.

A Fire Protection Hand-book

Among the numerous publications that are now being issued by forest officials in regard to the management of forest fires, one of the most practical and serviceable that has come to our attention is a "Treatise on the Protection of Forests from Fire," by W. V. J. Hall and C. L. O'Hara, superintendent and assistant superintendent of the Bureau of Forestry of the Province of Quebec. This is printed in convenient pocket form with a durable cover and treats of the whole subject of prevention and handling of forest fires in a practical and comprehensive way. There is a useful glossary which makes the manual more serviceable for the average layman.

NEWS AND NOTES

Railroad Cooperation in Fire Protection

The Western Forestry and Conservation Association, of which Albert L. Flewelling of Spokane is president, has perfected a plan to utilize certain departments of the railroads operating in Washington, Oregon, California, Idaho, and Montana in warning the people in the five states against carelessness with fires in the forests during the summer months. E. T. Allen, forester of the association, made the foregoing announcement while in Spokane, and outlined the plan in brief as follows:

"Forest protection is of the utmost benefit to all our people, and we believe we can enlist their cooperation in this work. With that end in view all ticket envelopes, time-tables, folders, and pamphlets describing mountain, lake and forest resorts for western distribution will contain suggestions as to how to avert camp and other fires, also the means to be employed in combatting the element. Booklets dealing with the same subject will be placed in observation cars and placards

are to be posted in the waiting rooms of forest stations. The association will bear the extra expense occasioned by this work.

"No agency has quicker and better means of reaching the public than the railroads, as almost every one travels and reads railroad literature, and this step the Western Forestry and Conservation Association is taking is the first attempt to utilize it for forest protection. Railroad officials are keenly interested in the plan, as the roads profit equally with the public in reducing the destruction of forest resources. The lumber industry not only furnishes a large proportion of their traffic, but also brings into the northwestern and coast states more than \$150,000,000 a year, most of which goes into general circulation to build up business of all kinds. Irrigation and power development depend much on forest regulation of stream-flow. Tourist and resort travel is affected by destruction of scenic and game conditions by forest fires, and every acre of timber or second growth destroyed means a money loss to the railroads as well as to the nation."



LUMBERMEN AND LUMBER JOURNALS

The Lumberman's Attitude Toward Forestry

By JOHN E. RHODES, President Minnesota Forestry Association

Reprinted from the *Minnesota Horticulturist*

I am interested in forestry in spite of the fact that I am in the lumber business. I might say I am interested in forestry because I *am* in the lumber business. The lumbermen have looked upon the forester in the past as a good deal of a crank. There was considerable antagonism between the forester and the lumbermen. It is the lumberman who blazes the path. While the theorist looks around for danger, the practical man has his gaze concentrated upon his own business. There are on my grandfather's farm in New York a good many stumps of black walnut larger around than this desk. Those trees were originally cut for firewood, because at that time they had no value and could not be cut for lumber; hence they were used for fuel. The same is true of lumber operations in this country. They cut the white pine because it had the greatest value; later they cut the Norway; and as the price of lumber has advanced the log has decreased in size, the available trees of highest value have decreased, and they have taken one species after another. The lumbermen are taking increased interest in forestry simply because the timber supply is getting to a point where they can afford to do so.

There are two obstacles to the practice of forestry. Lumbermen are confronted first by the fire risk. There is more timber burned in this country every year than is cut by the lumbermen—a great deal more. The lumbermen feel they should not be criticized for what is called "wanton destruction of the forests." Lumbermen are engaged in the cutting of the timber for the purpose of supplying the demand that exists for it, and the public generally is equally responsible and should share that responsibility with the lumbermen. The great prairie sections tributary to Minneapolis, the great state of Iowa, southern Minnesota, North Dakota, and South Dakota, could not have been built up by the people with the rapidity they have been had it not been for the near and cheap supply of lumber, and if these great forests had not been sacrificed, the present development of this great prairie country would have been impossible. It would not only have meant much to the development of this prairie section, but it would have meant much to the nation at large and to the world at large if the sacrifice of these forests had not been made.

As the lumber production has decreased and the price of timber has increased from 50 cents to \$5 and \$10 per thousand feet, it has become possible to consider the expenditure of money for fire protection and for other things relating to forestry. Some reference has been made to the burning of slashings, and by that is meant the refuse left from logging operations. Lumbermen having large interests found that their property was menaced by timber in which the "slashings" had not been burned, and they favored the law which was passed by Minnesota requiring slashings to be burned. That law is being generally complied with. The lumbermen found it did not cost as much as they thought it would, and they are now taking care of the slashings at 25 cents to 50 cents per thousand on an average. They are sorry they did not do it years ago, and when they add 25 cents to the present value of the timber for fire protection it is a small percentage of the cost compared with what it was when standing timber was worth \$1 per thousand.

Lumbermen in the west are interested in organizing extensive fire protection systems and are cooperating with the nation and state in an effort to establish a federal system of control, putting in telephone lines, hiring extra men during the dangerous season, and taking every possible precaution to protect their timber from fire. The chief cause of fires is railroads; forty-five out of every hundred fires are started by locomotives. Railroads cooperate actively in keeping their rights of way cleared of dead grass and leaves because it is in that way that fires usually start. Thirty-five out of every hundred forest fires are started by settlers clearing land. If the land is to be used for cultivation, the settlers are anxious to clear it off as rapidly as possible, and the quickest way to do this is to burn the refuse, and they are not cautious enough in taking care of these fires. When there is a high wind and a dry season, there is extreme danger. It was the settlers who caused the fires in northern Minnesota and Wisconsin two years ago. Those fires worked such great destruction that the settlers who were responsible for starting them were arrested and taken before a justice of the peace in the town, where they were fined \$5, and they said: "It is worth more to us than that to have our land cleared." There

was no healthy public sentiment back of the law. The pine will grow if the fires are kept out, but will not if the fires are not kept out. If the fires are not kept out, it will burn up the small seedlings, the cones are destroyed, and worthless brush will come up.

The second great obstacle to the adoption of forestry by lumbermen is the question of taxation. There is much agitation in the country for the preservation of forests and for reforestation of cut-over lands. The lumbermen are interested in this question just as much as the forester or the public and hope some solution will be worked out. It takes from seventy-five to eighty years to grow a white pine tree to merchantable size. We are confronted with the fact that we are obliged to pay taxes every year upon a crop that has not been harvested or that may not be harvested twenty years hence. The farmer pays taxes on his land, but he harvests a crop every year. The lumberman may pay a large amount of taxes before his crop is harvested. The present system of taxation makes scientific logging methods absolutely impossible. We have considered this question from every standpoint, and various plans and methods have been proposed. There is before the people of the state of Minnesota a proposed amendment to the constitution, permitting the legislature to enact a special forest land tax law. If there exists sufficient public sentiment in Minnesota that amendment to the constitution will pass. It is very difficult indeed to arouse sufficient interest on the part of the general public to vote in favor of an amendment to the constitution. We need to go through a few more fire years such as we have had in the past to arouse public interest to see the necessity of revising the tax laws, and if there is a demand for practical forestry methods we must secure some relief from taxation, or they cannot be undertaken.

The lumberman is greatly interested in forestry schools. We are particularly interested in the forestry school of this state in charge of Prof. Samuel B. Green. We look to the foresters that are now being educated to work out these problems for us. The lumbermen who are now passing—the older generation of lumbermen—who have been engaged in business under methods in vogue for the past forty years, cannot be expected to see the necessity for new methods. They cut the timber to supply the demand that existed then, and they did it in the cheapest possible way. It has only been within the past five or six years that the people have come to realize that the timber is not inexhaustible—the older lumbermen now realize it.

The production of lumber has about reached its maximum. It has greatly declined in Minnesota. In 1890 the production in Minnesota, Wisconsin, and Michigan was 9,000,000,000 feet, and this year it has been less than 3,000,000,000 feet, but there has been a great increase of yellow pine in the southern and western states, so that the total production

in the United States at large last year was greater than ever. It will be about the same this year, but I think it has reached its climax. Some reference was made by one of the speakers to the fact that the production was less in 1908 than in 1907. That was due to market conditions. You will remember that we had a panic in 1907, which retarded building operations and which extended its effect into 1908.

I also wish to refer to a statement made by one of the speakers in reference to a decision by the Maine supreme court. The papers of the country had a great deal to say in regard to it. The state of Maine has a peculiar law, under which the legislature can ask the opinion of the supreme court regarding the constitutionality of any law proposed before the law is passed. The state legislature of Maine asked the supreme court if a law providing for putting private lands under certain restrictions would be constitutional. The supreme court stated that under the conditions mentioned, which would inure to the benefit and welfare of the community at large, such a law would be constitutional, but the law has not been passed, and the constitutionality of it has not been passed upon. Investigating that subject, we find if there is a tendency to restrict cutting on private lands it is going to result in very serious complications, for this reason: that if the law prohibits the cutting of trees of certain diameter, you immediately get into technical forestry, because different species of timber are of different growths and ages. There are also different requirements for different sizes of logs. We are looking to foresters to work out questions of this kind.

Personally, I have no fear of a timber famine in the future, because I feel sure that, with the careful study which is being given to the forestry question—especially by the lumbermen and timber owners—who, by the way, control three-fourths of the timber supply in the United States—they will find some solution of the question; but it will not be without further advances in values of timber lands, and that will mean a further increase in the price of lumber. Already the price has reached a point where you are using substitutes for lumber. Its principal competitor is cement, and the inroads that cement has made upon the lumber industry in the past few years you are all familiar with. A few years ago the average town had wooden sidewalks; to-day it is a rare thing to find a sidewalk not made of cement, and that change took out of the market the demand for millions of feet of plank. Fences used to be made entirely of lumber; now they are made of wire. Lumber is still being used for buildings to a great extent. Our buildings are nearly all put up in a hurry in the cheapest possible manner, and we are only just beginning to build them of fireproof material. The price of lumber has reached a point that even where it costs to build a house of cement a trifle more than it would to build

it of lumber, the cement will be used, because it provides greater permanence, with a reduced fire risk. So we expect in the near future, possibly in fifteen or twenty years, to see a natural decrease in the production of lumber.

This also takes into consideration the lumber to be cut on national forest reserves and the increasing tendency of the states to buy timber lands for state reserves. We are going through the experience of the older countries. It is here exactly as it has been in Germany and France up to this stage, and there is no reason to believe that the future will be any different from what it has been in the old countries, where the consumption per capita of lumber is less than a hundred feet, compared with the per capita consumption in this country of 500 feet. We will have to reduce the consumption per capita, protect our forests from fires, and provide a just and proper system of taxation. I may say in regard to this system of taxation that there should be no tax on land until a crop is taken from it, and when the crop is harvested it should be taxed for its full value. This method has several advantages: it enables the owner to protect the timber from fire; it eliminates the carrying charge which comes every year; and it makes it an object for him to save and protect the timber until it is ready to cut.

National Hardwood Lumber Association

The National Hardwood Lumber Association held its thirteenth annual convention in Louisville on the 9th and 10th of June. The meeting was an important one, as the future policy of the organization was discussed and action was taken on the question of uniform inspection. The solution of this matter carried with it the appointment of a committee to secure a uniform standard of grading. The report of the committee on forestry was presented, as follows:

REPORT OF COMMITTEE ON FORESTRY

"The annual report made by your committee during the last several years has contained an intelligent survey of the existing conditions, and it has been its desire during the last year to watch closely developments and to note the attitude of the national government, as well as those of the various states, together with the action of the individual lumbermen, toward this all-important question.

"Among the nations of the world, the United States has for the last fifty years been noted as a country of deplorable waste, and, as we know, the hardwood lumber industry has keenly felt the lack of economy. We believe that our association has had much to do with the present recognition on the part of the chief executive of our nation and of Congress as to the crying need for the en-

forcement of such regulations as will effectively bring about a real conservation of the natural and national resources of this country.

"We deem of first importance a rational tax exemption law, patterned after the timber regulations of our neighbor, Canada, which will encourage the preservation of our forests, and not force, as at present, an immediate cut under penalty of expensive taxes. If laws were enacted which would make the American taxes only nominal, as in Canada, until the timber is cut and manufactured into lumber, then judgment and sagacity would be exercised in the amount and sections to be cut each year, so that the supply could be intelligently regulated to the demand, and reforestation could be greatly encouraged.

"At the present rate of consumption in the United States of over 50,000,000,000 feet of lumber per annum, it requires no prophet to foresee a complete exhaustion of the visible supply, unless a superhuman effort is exerted by the national and state legislatures, together with cooperation on the part of all men interested in lumber, to safeguard the standing timber and adopt effective measures for reforestation.

"Available statistics show that 3,000 to 5,000 sawmill men who are yearly sawing out their hardwood stumpage do not know which way to turn for future operation. Final exhaustion of hardwood timber in the United States would constitute an incalculable commercial loss and be far more reprehensible than the extermination of the American bison.

"Finally, the establishment of forest patrol by the government for the national forests, and by several of the states and many large concerns, is becoming wonderfully helpful in preventing forest fires. The annual average expense of this work has been about 4 cents an acre, including patrolling, clearing out old trails, making new trails, and actually fighting new fires.

"In southern California, where the forest cover of the mountains is of tremendous value in conserving the water to be used for irrigation, business men and bankers combined with the fruit growers, who were directly interested, and contributed a large sum of money, which they offered to the Forest Service on condition that the government give an equal sum, the whole to be spent by the Forest Service for fire protection work on the San Bernardino national forest reserve. The offer was promptly accepted, and a plan was adopted dividing the forest region into sections, which were separated by fire breaks or lanes fifty-five to eighty feet wide.

"From these lanes the brush and timber were removed to the roots, so that if a fire started it would be confined by the breaks to a comparatively small area, even if not discovered promptly. Trails were constructed to give ready access to the most important parts of the reserve, and a patrol was formed to watch for the first thread of smoke from

a starting fire. The result has been that since the beginning of the work in 1906 not a single fire of any magnitude has destroyed either timber or brush, or, what is perhaps more important, the spongy forest soil which is depended upon to hold back the water for a longer period of use.

The forest rangers who have charge of the national forest reserves in the United States each have about 670 square miles to watch; in Germany each forester has but two square miles to patrol. These rangers are valuable in many directions, because they not only patrol the forests and direct the fighting of the fires, but also collect evidence of and institute prosecution for violations of the fire and timber laws.

This is only another evidence of the trend of the times in recognizing the value and needs of the great timber industry, and of intelligently applying regulations which can not only mean the prolongation of the natural supply, but also prevent our becoming dependent in a few years on our Canadian neighbor for a timber supply that she may be loath to accord us. In view of the expanding growth of northwestern Canada, which has of late attracted so many Americans, that progressive country, with a watchful eye for the future, will profit by the economy of the old world and the extravagance of the United States, and undoubtedly reserve for her own use the virgin timber with which she has been so richly endowed by nature.

"In conclusion, we urge your honorable body to reaffirm your past declarations and extend effective effort on the following important points: (1) Tax exemption, which will result in an equitable annual cut; (2) a system of ranger patrol, preventing and curtailing fires and wanton waste; (3) a practical reforestation plan which will instill into the minds of every citizen the necessity of providing a timber growth for future generations."

The following officers were elected: President, F. A. Diggins, of Cadillac; vice-presidents, F. S. Underhill of Philadelphia, Orson E. Yeager of Buffalo, and J. V. Stimson of Huntingburg, Ind., and the following directors: For three years, T. M. Brown of Louisville, C. A. Goodman of Marinette, Wis., Oliver O. Agler of Chicago, E. E. Goodlander of Memphis, E. V. Babcock of Pittsburgh, J. H. P. Smith of Cincinnati, and Charles B. Dudley of Memphis; for the two-year term, Arthur H. Bernard of Minneapolis.

Mr. Diggins, the new president of the association, is one of the group that are responsible for the good management and skilful utilization that has distinguished the wood manufacturing industries of Cadillac, Mich., above those of many other towns with equal advantages in the beginning.

It was decided that the annual meeting of the association in 1911 should be held in Memphis, Tenn.

The Grading Conference

On the 31st of May and the 1st of June, representatives of the Eastern States Retail Lumber Dealers' Association, the New York Lumber Trade Association, and the Hardwood Manufacturers' Association met in New York and conferred upon the matter of grading rules. The changes decided upon are epitomized as follows:

1. It was decided that when a question of grade only was in dispute, it would be necessary to hold only that part of the shipment intact that was complained of, instead of the entire car, but that when the question was one of quantity, the entire car must be kept intact until agreement was reached.

2. The standard rough thicknesses were adopted as shown in the book, and to this was added that ten per cent of the shipment, which might be one-sixteenth inch scant of the standard thickness.

3. Slight reconstruction was made in the sap specifications for No. 1 common poplar, the quantity of sound discolored sap admitted being reduced to twenty per cent.

4. In the divisions of lengths under No. 1 common in the various woods, the percentage of short lengths was held by the eastern lumbermen to be too severe, and these divisions were changed one foot.

5. Also, along the same line of short lengths, the percentage of the short lengths allowed the first and seconds and in No. 1 common were reduced five per cent in all the various woods.

6. In the grading book of the Hardwood Manufacturers' Association, except in poplar, no percentage of firsts was specified, and it was decided to insert in the rules the percentage of firsts that should be contained in the combined grade of firsts and seconds. This was set out in detail.

Secretary Doster, of the Hardwood Association, is quoted as saying that this is the first time in the history of the hardwood industry that an agreement has been reached along these lines of such far-reaching proportions and of so great importance to the industry.

The representatives to the conference were men of high standing in the business and they represented influential associations with very large interests. The *St. Louis Lumberman*, in its report of the conference, sums up the result by saying: "The question of waste will be helped toward solution by the workings of this agreement, which allows the producer to work up more of his material than in the past, and thus conserve the ends of conservation. He is enabled to utilize the short clear lengths, by the cutting up process, which, in the entire board, would not be of sufficient value to stand the freight on long hauls, and would be left in the woods to decay."

Chicago as a Lumber Market

Lucius E. Fuller, editor of the *Lumber World*, in the *Pioneer Western Lumberman*, describes Chicago as the "premier lumber market of the world." He states that the largest wholesale lumber yard in the country is located there, and that there is a stock on hand at all times in the pine and hardwood yards of from 300,000,000 to 380,000,000 feet of rough lumber. He also notes the quantity of hardwoods and the great variety of all kinds that may be called for. The receipts of lumber at Chicago by rail and water in 1909 aggregated 2,578,309,000 feet, an increase of 509,675,000 feet, or twenty-four per cent, over the receipts during 1908. Of this amount 1,614,000,000 feet were consumed in the city for purposes of various kinds. The shipments from Chicago in 1909 were 969,000,000 feet, being nearly 200,000,000 feet larger than in 1908.

These figures, Mr. Fuller says, are far ahead of the reports furnished by New York, and fully double the figures emanating from other markets where any record is kept of the lumber movement.

Making the Most of the Log

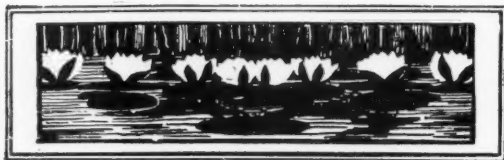
A subscriber for the *American Lumberman* directs attention to the large amount of stumpage that well could go into higher uses that is being sawed into low-grade products by men who are not directly engaged in the lumber business. In the east such operators are buying areas of timber, logging them, and turning the entire product into goods for their specific requirements, with the inevitable result that a large amount of high-grade stock goes into this consumption along with the low-grade timber that is properly suited thereto. They are satisfied because they can manufacture these articles at a low cost, even with the high grades in, since the operation is all their own and the profits of manufacture their own exclusively.

Yet a question arises as to whether they are not throwing away good profits in sawing up No. 1 pine or spruce into low-grade articles. Unfortunately, not only they are the losers, if such be the case, but the public at large is a loser. Their own loss is their own lookout, and the man who ignores the opportunity to take a larger profit receives but scant sympathy. In recent years, however, the men who are cutting the forests of the United States have had it indicated to them that they have responsibilities larger than that they owe to stockholders or themselves. Every good log that is used for a baser purpose than that to which it is suited is a loss to the lumber industry of the United States and to the consumers who are dependent upon that industry for their lumber supply.

It is difficult in this practical age to preach altruism, but perhaps a demonstration of the sacrifice of profit in this indiscriminate use of timber might appeal to such a timber consumer and thereby serve the higher purpose of saving high-class stock for high-class purposes, now certainly sufficient to consume all of the upper grades that are available without permitting them to be manufactured into articles that can as well be made from lower grades.—*American Lumberman*.

More Money for Fire Protection

The state forestry commissioner believes that if the legislature and the forest fires would occur at the same time, the state would be better equipped to fight the latter. At the present time there is available each year \$14,000 to support the work of protecting the forests of the state, a sum by far too little if the work is to be effective in seasons when there is the greatest danger. The proper expenditure of a much larger sum would save many times as much in property that is now wiped out annually by fires in the timber sections of the state.—*Mississippi Valley Lumberman* (Minneapolis, Minn.).



NEWS AND NOTES

Forests as Gatherers of Nitrogen

At a recent meeting of the Society of American Foresters, a paper was read by Treadwell Cleveland, Jr., on "Forests as Gatherers of Nitrogen." This paper summarized results recently obtained by Jamieson, of Scotland, and by Zemlen and Roth, of the Royal Hungarian Experiment Station at Selmechanya, which tend to show that forests are able to appropriate free atmospheric nitrogen by means of their trichomes. Jamieson investigated several forest trees (as well as a number of small plants), among which were *Acer campestre*, *Tilia europæa*, *Ulmus campestris*, *Sorbus aucuparia*, *Fagus sylvatica*, and *Picea concolor*. Zemlen and Roth included a large number of additional species. In all cases chemical tests show the presence of nitrogen in the trichomes, and the investigators believe that they have excluded all other sources for this nitrogen than the atmosphere. Professor Henry, of the Forest School at Nancy, France, was the first to point out that forest soils are enriched in nitrogen by the decay of fallen leaves.

Zemlen and Roth are cautious in their conclusions, and urge that further investigations be made in this field.

Eucalyptus for Railway Ties

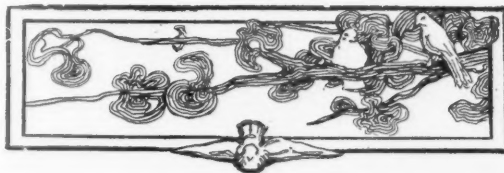
The Atchison, Topeka and Santa Fé is one of the great railway systems that has gone largely into the growing of trees to supply it with cross ties. On the San Dieguito Ranch, of 8,600 acres, purchased by the company several years ago, eucalyptus is being grown on a large scale. The ranch lies in

the valley of San Dieguito River, five miles east of Del Mar. Much of the land was rough, hilly, and overgrown with greasewood. The ground was first cleared, harrowed, and then prepared for planting. Three years ago the first seedlings were set out. The company since then has planted 500 acres a year. The seedlings are set out eight feet apart in rows and the rows five feet apart. This provides for the planting of 1,100 trees to the acre. When about six years old many of the trees will be thinned out. At that age the trees so cut out will yield three or four good fence posts to the tree, with leavings for firewood, bringing in considerable revenue.

The thinning process will be kept up until about 200 trees are left on each acre of ground, which means several thousand ties when they are eventually cut. Ordinary ties now are worth about \$1 each. Twenty years from now they will be worth a great deal more. Eucalyptus culture demonstrates that saplings will grow from old tree stumps. This provides for a second crop to be grown more quickly than the first. The blue gum is expected to make a yearly growth of from twelve to fifteen feet during the first few years.

The Santa Fé started in to grow the trees without irrigation, and so far has been successful beyond expectations. However, to insure a more rapid growth, recently a large pumping plant has been installed.

Several varieties of the sugar gum planted three years ago have reached a height of eighteen to twenty feet and from fifteen to sixteen inches in circumference. The sugar gum is being grown exclusively for tie-making purposes. The company expects to allow the trees to grow twenty years before they are cut.



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